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THE

**JOURNAL**

OF

**THE ASIATIC SOCIETY**

OF

**BENGAL.**

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**VOL. II.**

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THE
JOURNAL
OF
THE ASIATIC SOCIETY
OF
BENGAL.



EDITED BY
JAMES PRINSEP, F. R. S.
SECRETARY OF THE ASIATIC SOCIETY.

VOL. II.

JANUARY TO DECEMBER,
1833.

"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

SIR WM. JONES.

Calcutta :

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1833.

P R E F A C E.



ON completion of this second volume of the JOURNAL OF THE ASIATIC SOCIETY, the Editor feels it to be due to his subscribers, as well as to himself, to lay before them as briefly as possible, the results of the arrangements which he contemplated carrying into effect at the conclusion of the last volume;—more especially as a somewhat erroneous estimate of the cost and circulation of the JOURNAL found admission into a late notice of the Indian Periodical Press, drawn up by the Editor of one of the morning papers. The JOURNAL is not published, as there stated, by the Asiatic Society, but solely at the cost and responsibility of the Secretary, who was Editor of it before he enjoyed the honour of an election to that office. Since there never has been the least view to profit, either in the GLEANINGS or in the present work, there can be no object whatever in concealing any information respecting its publication; and it may be useful hereafter to find on record a note of the expences of printing, and the difficulties against which a Journal exclusively scientific has had to contend, as well as the advantages which it has enjoyed, in India at the present time. The following particulars have therefore been extracted from the accounts of the two years now terminated.

The amount of subscriptions to the JOURNAL at one rupee per number, including two extra numbers, in 1832, was Rs. 5148 8

From this, deducting 20 per cent. commission paid to Messrs. Thacker and Co. for circulating it, 1028 11

There remained net subscriptions available, Rs. 4114 13

The Baptist Mission Press charged for printing and stitching 500 copies, Rs. 3742 10

And the 15 plates cost with printing, 416 5

Total 4178 5

The result of the first year exhibits a sufficient accordance between outlay and return. Of the amount subscribed however, only Rs. 3786 13 have been collected up to the present time, so that in fact there was a deficit of Rs. 392 2.

The alterations which the Editor proposed and completed for the second year were :—

1. The saving of nearly half of the commission paid for the mere circulation of the work (without responsibility), by undertaking that duty with the aid of his establishment as Secretary of the Asiatic Society;

2. As a return for this favor, he proposed circulating the Journal gratis to such of the paying members as should express a desire to take it in.

The effect of this scheme has been as follows :

Fifty members of the Society have availed themselves of the privilege, which has made a deduction to the same amount from the monthly receipts. The number of copies circulated, including those sent to subscribers and societies in Europe, is about 450.

The number of paying subscribers on the list, is 320, which at 1 R. per month, (including one extra number of Buchanan,) would give Rs. 4480.

The expenses of printing 500 copies, of 670 pages,

at 4-5 per page, may be stated at	Rs. 2,890
144 pages of Buchanan, at 4-8 per page,	648
Covers, table work, &c. charged extra,	250
40 pages of Appendix, at 5 Rs.	200
28 plates (18 lithographs, 10 engravings*),	480
Establishment for circulation,	600

— 5,068

Leaving a loss on the year of Rs. 588, or nearly as much as the subscriptions of the members exempted from paying.

But it must be mentioned, and mentioned with a degree of disappointment which is almost disheartening, that of the flattering list of sub-

* For these the cost of printing and paper only is charged.

scribers above given, 70 have not paid any part of the year's subscription, and as many more are still in arrears; so that a balance of Rs. 1321-8 still remains to be collected. The actual state of the concern is therefore by no means so favorable as could be wished, for it leaves the Editor out of pocket upwards of 2000 Rs. as the reward of his labour for two years ! But will not for a moment suppose that the balances outstanding are not recoverable : on the contrary the principal difficulty lies in the distance, and the supposed want of a mode of remittance.—Many subscribers are not aware, that letters containing *hoondees* for the amount may be transmitted *post free* to the Editor.

It will be remembered, that the Bengal Government were pleased to bestow the privilege of free postage on the *GLEANINGS* and on the *JOURNAL*, on condition of the publication of the late Dr. Buchanan's Statistical Reports. Under the impression (justly formed) of a corresponding increase of circulation, consequent upon this liberal boon, it was resolved not to incorporate these records in detached notices in the *JOURNAL*, nor to diminish from its original matter*, but to publish them as a separate work ; and one volume has accordingly been completed, containing 356 pages, which at 4-8 per page have cost Rs. 1,602

And a reprint of the first 108 pages, which became necessary on the subsequent extension of the edition from 300 to 500 copies,

216

Total, Rs. 1818

This expence has been incurred therefore on account of Government, in return for the postage saved, not to the work, but to the subscribers of the *JOURNAL*. On the completion of the first volume of *BUCHANAN*, a second extra volume of an official nature on the Monetary System was commenced, of which 50 pages have been printed with 3 plates, being in fact an expence of more than 300 rupees not included in the above estimate. The Government meantime placed the remaining volumes of Buchanan in the Editor's hands, with an intimation of its "desire that the printing of these records should be continued." It was therefore with no small feeling of mortification that

* Originally 32 pages only were given in each number, latterly 64.

the EDITOR perused the following letter, announcing that the privilege of free postage should cease from June next, especially after having been honored, on an explanation of the nature of the work, with an extension of the same privilege to the Madras presidency, in addition to that formerly bestowed by the Governors of Bombay and Ceylon.

To JAMES PRINSEP, Esq.

Genl. Dept.

Editor of the Journal of the Asiatic Society,

Sir,

I am directed to inform you, that the Governor General in Council has resolved, that after six months the exemption from postage, which is now enjoyed by the Journal of the Asiatic Society, shall be discontinued.

I have the honor to be,

Sir,

Your most obedient servant,

Council Chamber,

G. A. BUSHBY,

2nd Dec. 1833.

Offg. Sec. to Govt.

It may reasonably be feared that many subscribers at distant stations may be unable to continue their support to the work, when its cost shall be enhanced by postage; but (should it be impossible, on a proper and respectful representation of the circumstances, to avert the imposition of postage) every means will be taken of lessening the burthen by sending the monthly numbers by the bangy instead of the regular dāk.

On the contents of a volume which has already been perused by nearly all to whom it circulates, it would have been obviously needless to make any remark, were it not desirable to prove that the favors hitherto conferred upon the work by the Government of the country had not been altogether misapplied.

Independently of the volume of Dinajpur Statistics, which forms a model for the use of public officers engaged in collecting similar information, the GLEANINGS and the JOURNAL have been the means of bringing to notice many of the mineral resources of our vast Indian Empire, and of leading to fresh discoveries by the announcement of what had already been found: coal may be adduced as an example,—of which twenty or more different localities have been brought to our knowledge through its pages, where only two were before known. Of the native mineral productions, iron, copper, gold, &c. :—Of the native arts and manufactures, salt, nitre, turpentine, dyes, mills, &c. numerous original ac-

counts have been inserted : catalogues of woods, medicinal plants and drugs : experiments on materials, wood, iron, cement ;—Statistical reports ;—descriptions of newly explored countries and people :—in fact, it would be difficult to open a number of the JOURNAL without finding some information which must possess value in the eyes of a government. Contributions of a more exclusively scientific nature have, in the mean time, continued to multiply, and the objects pointed out as desiderata at home in the geography, meteorology, geology, and natural history of this country, are in the course of rapid and systematic elucidation. So numerous for instance have been the registers of the weather offered for publication, that space could only be found for abstracts of many. There has hardly been time for the collection of materials regarding the tides of the Indian coasts, suggested in the Rev. Professor WHEWELL'S circular, (inserted in page 151,) but the attention of those who have opportunities of eliciting the information required, is again solicited to this object.

As a proof of the benefit conferred on science by the free and extensive circulation of a periodical devoted to such objects, the Editor feels pride in alluding to the ardour which his plates of ancient coins have inspired in many active collectors, and above all to the reward bestowed on himself by the munificence of General VENTURA, the most successful pursuer of antiquarian research in the Panjáb, who has presented to him all the coins and relics discovered on opening the celebrated Tope of Manikyala. They are now on their way to Calcutta.

That extracts and analyses of European science have not been more frequent must be attributed once more to want of space and want of leisure. The Editor would recommend all who seek for knowledge of the progress of science in Europe to procure a copy of the Reports of the British Association for 1832, in which they will find every branch discussed by the philosopher best able to give it illustration. To attempt to shorten those admirable essays would be mutilation rather than abridgment ; yet unfortunately most of them are too long for the pages of a monthly journal.

On the subject of orthography of native words, the Editor is driven to make one concession, for which he fears the learned Societies at home

will denounce him as an apostate to the system of their leader. Every communication, with hardly any exception, which comes for publication, adopts the Gilchristian mode of spelling, or that modification of it which has been *ordered* to be used in all Government records, surveys, &c. An attempt has been made hitherto to conform the whole to Sir William JONES' method, but necessarily there have been continual omissions, and the contributors in most cases express themselves but ill pleased to see their words transformed into shapes but ill accordant with ordinary *English* pronunciation. The Editor has therefore resolved to adopt the middle course followed in HAMILTON's Hindustan, namely, to print all Indian names and words in the ordinary roman type as they are usually written and pronounced, and to place in italics all such native terms and proper names, as are corrected, and spelt according to the classical standard of Sir William JONES: in many cases the latter may be inserted in brackets after the ordinary word.

Where contributors have occasion to illustrate their papers by plates, it will be a great convenience to the EDITOR to have the original drawings prepared of the same dimensions as the printed page of letter press, to save the trouble and expence of reducing them.

The EDITOR will not allude in this place to the severe loss he has sustained in the death of some of the most able and constant supporters of his work, and the departure to Europe of others in the course of the past year; since he hopes that a more worthy channel will be found for the record of their meritorious labours for the cause of Science in India, in the Proceedings of the Asiatic Society, to which their names belong, and in which their reputation must ever be cherished with fond remembrance.

1st January, 1834.

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JOURNAL

OF

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No. 20.—August, 1833.

I.—*Origin of the Shákya race, translated from the ལ (La), or the 26th, volume of the mDo class in the Ká-gyur, commencing on the 161st leaf. By M. Alex. Csoma de Körös.*

ON a certain occasion, when SHAKYA (in the text སངས་རྒྱལ་བཟོམ་ལྷན་པ་ *Sangs-rgyas bchom-lan hdas* ; Sanscrit, *Buddha Bhagaván*) was in the *Nyagrodha* grove (S. *A'rama*), near *Ser-skya Gzhé* (S. *Capilavástu*), many of the *Shákya*s that inhabited *Capilavástu* being gathered together in their council-house, questioned one another, saying ; *Shès-dan-tak !* (ཤེས་ལྡན་དག, “intelligent ones :” an address.) “Whence sprang the *Shakya* race ? What is their origin ? What is the cause or reason thereof ? And what is the ancient national descent of the *Shákya*s ? If any one should come to us, and ask us about those points, we could not tell him whence the *Shákya*s originated. Come, let us go to *Bhagaván* and ask him on the subject, that we may abide by his saying.”

Thereupon a very great number of the *Shákya*s inhabiting *Capilavástu*, went to the place where BHAGAVÁN (*bchom-lan hdas*) was, and after having made their salutation by prostrating themselves at his feet, sat aside.

Having addressed him by this term བརྗལ་པ་, *btsun-pa* (Venerable Sir !) they repeat again, how they had been assembled, on what subject they had talked, and how they had resolved to come before him ; and then they begged of him, that he would acquaint them with those things that they might afterwards tell them to others.

BHAGAVÁN thinking that, should he himself tell the history of the ancient national descent of the *Shákya*s, then the *Tirthikas* and

Parivrajakas (or they that are not of his followers) would say, that GAUTAMA tells whatever he pleases, to praise himself and his tribe. Not to give them an opportunity for using such expressions, he reflected within himself who were there among his disciples, who could tell, in an instructive manner, the ancient descent of the *Shákyas*.

Perceiving MONGALYANA to be present, and judging that he was a fit person for that purpose, he called on him, saying, "*Mongalyana*, I am somewhat indisposed (I feel some pain in my back), and want repose; be you empowered by me to tell to the priests (*Gelongs*) in an instructive manner the ancient national descent of the *Shákyas*." He, nothing loth, assented. SHAKYA, seeing that he obeyed his bidding, and having folded up his cloak, and put it for a bolster or cushion, leaning on his right side, and laying his feet upon each other, with a clear knowledge, recollection, and self-consciousness, composed himself to sleep.

MÓNGALYANA, (with the prefixed title ཏིང་ལྷན་པ་, *S. Ayusmán*, long-lived; *Ayusmán Móngalyana*,) in order to collect his ideas on the subject, entered into a deep meditation, wherein he saw the whole story. Recovering from his ecstasy, he sat down on a carpet, spread on the ground, in the middle of the priests. Then he addressed the *Shákyas* of *Capilavástu*, in the following manner:

"*Gautamas!* (or descendants of *Gautama*, རྒྱུ་ཏཱ་མ་རཱ་ཏཱ་). When this world was destroyed, the animal beings (སེམས་པ་ཙན་ *Sems-chan*, Sanscrit *Satwa*), mostly were born again amongst the gods, in that division of the heaven, which is called that of "clear light" (*S. Abháswára*, Tib. རྫོད་ཀྱི་ལྷ་ཁང་). And they resided there for a long period of time, having an intellectual body, perfect in all its members and limbs, of a good colour, shining by itself; they walked in the air or heaven, and their food consisted of pleasures only.

At that time this great earth was turned into mere water; it consisted of one lake or ocean. At length, on the surface of that ocean there was formed by the air a thin substance, like skim on the surface of boiled milk, that grew hard and covered the whole surface. That earthly essence was of a fine colour, odour, and taste. The colour like that of fresh butter; the taste like that of refined honey. Descendants of *Gautama!* Such was the beginning of this world.

Then, some animal beings in *Abháswára*, having finished their lives, were born again to taste of the condition of man, and came to this earth. They were with a perfect body produced from the mind (or

they had an intellectual body), having all their members and limbs entire; they had a fine colour, and they were shining by themselves; they walked in the air or heaven, and fed on pleasures only; they lived for a long period.

There was at that time in the world no sun, no moon, no stars, no distinction of time, no moment, no minute, no night and day, no month and year. No distinction into male and female sex. They were called all by this one name, Animal (སྤྲུལ་སྐྱེས་ *Sems-chan.*)

Afterwards an animal being, of a covetous nature, tasted with his finger's tip of the earthly essence (*Sahi-b, chud* སྤྲི་བ་རྒྱུད་), and the more he tasted the more he liked it, and the more he liked the more he ate thereof, till by little and little he ate a mouthful. Other animal beings having observed him, they likewise did the same.

When those animal beings had eaten, successively, each a mouthful, then entered into their bodies solidity and heaviness. The brightness of their colour vanished, and then arose darkness in the world. *Gautamas!* After there had morally arisen darkness in the world, the sun and moon appeared, and so the stars also, and the distinction of time into moment, minute, night and day, month and year, began. They passed thus a long time, living on that essential food. They that had eaten but little of that food were possessed of a fine complexion or colour, they that had eaten much became of a bad colour. And so from the measure of food, there arose among them two species of colour. "Ha! Animal being! I have a good colour, thou hast a bad colour;"—thus spoke contemptuously one animal being to another. On account of the sin of such proud talk with respect to colour, that earthly essence disappeared.

Gautamas! The earthly essence having disappeared, the animal beings, gathered together, uttered many lamentations, and recollecting what a fine flavour it had, regretted much the loss of that substance.

Gautamas! After the earthly essence of the animal beings had vanished, there arose from the earth a fatty substance of a fine colour and taste. They lived for a long time by eating of that substance. They that ate but little of that food were possessed of a good complexion or colour; they that ate much became of a bad colour. And thus from the measure observed in eating, there arose among them two species of colour. "Ha! Animal being! I have a good colour, thou hast a bad colour;" thus contemptuously addressed one animal being to another animal being. On account of the sin of pride, again, the fat of the earth disappeared.

Gautamas ! The fatty substance of the earth having disappeared, the animal beings gathering together, uttered lamentations ; and recollecting what a fine flavour it had, they regretted much its loss : but they could not tell in words their sentiments.

Gautamas ! After the greasy substance of the earth had vanished, there arose a sugar-cane plantation, of a fine colour, odour, and taste. The animal beings passed afterwards a long time by living on that food, until the same cause led to its disappearance.

Gautamas ! After the sugar-cane plantation had vanished, there came forth clean and pure *sālu* (rice), without being ploughed or sown, having no straw, no husk, no chaff ; if cut in the evening it ripened again till the next morning (or there was every evening and morning ready a fresh crop). The animal beings passed a long time living on *sālu*.

From the use of that fruit there arose the distinction of sexes. Some of the animal beings became males, and some females. The different sexes regarded each other with fixed eyes. The more they regarded each other, the more they became affectionate and desired each other. Being observed by others, they were reproached by them for their actions, and hated. They threw on them stones, clods, &c. (in the same manner as now they use at the celebration of nuptials, to cast or sprinkle on the bride scented powder, perfume, chaplets, clothes, and parched rice, saying, May you be happy !) and reproved them much. The others, in their turn, replied, "Why do you thus abuse us now, is there no other proper time for telling us these things ?"

Gautamas ! Thus what anciently was regarded as an immoral action, is now taken for a virtue. They restrained themselves for a time (for 2, 3, or 7 days) from satisfying their lust. But afterwards not being able to contain themselves, they commenced to make some covert, or hiding place, whither they might retire from the sight of others to satisfy their lust ; saying repeatedly, We will practise here what is not to be done elsewhere, and uttering, *Khyim, khyim* ; covert, covert, or house, house.

Gautamas ! This is the first beginning of building houses.

They used to gather in the evening the *sālu* that was required for the evening repast, and in the morning that which they wanted in the morning. Afterwards it happened once that a certain animal being having gathered *sālu* in the evening for the next morning also, when he was called on by another animal being to go and gather *sālu*, he said to him, O animal being, take heed to thine own *sālu*, I have brought

yester-evening the *sálu*, which I require this morning. Then the other animal being reflected with himself thus ; Ah well then ! I shall hereafter take *sálu* for 2, 3, nay for 7 days, at once." He did afterwards accordingly as he had said. Then an animal being said to him, " Come, let us go to bring *sálu*." He then said to him, O animal being, take care for thine own *sálu* ; " I for myself have brought at once, for seven days." Then that animal being reflected with himself thus, " O well, very well, I shall take at once for fifteen days—for one month." And he did accordingly. When the *sálu* had been taken thus by anticipation by these animal beings, there grew afterwards *sálu* that was covered with straw, husk, and chaff, and when cut down, grew not again.

Then those animal beings assembled together, and reflected on their former state thus :

Shes-dan-tak ! (ཤེས་དན་ཏག་ཅུག་ཅུག་, &c.) See leaves 168, 169. [Here follows a repetition of the above described stories respecting the several changes that took place in the state of the animal beings. How perfect they were formerly, and how degenerate they are now.]

Afterwards, being gathered together, some of them said, " We must mete out the land and assign the boundary of each property ; saying, This is thine, and this is mine." Accordingly, they measured and divided the land, and erected land-marks.

Gautamas ! This is the first time in the world that men commenced to erect land-marks. This also was a natural consequence.

It happened afterwards, that an animal being, who had his own *sálu*, took away that of another not being given to him (or stole it). Other animal beings having seen him, that, though he had his own *sálu*, he had taken away that of another, not being given him, they said thus to him, " Oh animal being ! thou having thine own *sálu*, why takest thou that of another, without being given thee ?" They seized him and dragged him on this and on that side, and took him into the congregation, and then reproved him thus, " Sirs ! this animal being, having his own *sálu*, has taken away three times that of another without its being given unto him."

Then those animal beings said to this, thus, " Oh ! animal being, thou having thy own *sálu*, why takest thou that of another which he had not given thee ? Oh ! animal being ; go now away, henceforth do not act in this manner ?" Then that animal being thus said to the others, " Intelligent beings ! This animal being having dragged me on this side and on that side, on account of the *sálu*, taking me into the congregation, has also abused me (with his language)." Then those animal

beings thus said to that animal, "Ha! animal being! after having dragged this animal hither and thither on account of the *sálu*, and having brought him into the congregation too, why hast thou abused him? Oh! animal being, go thou now thy way, hereafter do not thus."

Then those animal beings reflected with themselves thus, Intelligent beings! On account of *sálu*, one is dragged hither and thither, and is rebuked also in the congregation. But we should meet, and from among us we should elect one (who is of a better complexion, handsomer countenance, more beautiful, more fortunate, and more renowned) for the master and proprietor of all our fields or lands.

He shall punish from among us those that are to be punished. He shall reward those that merit to be rewarded. And from the produce of our lands we shall give him a certain part, according to a rule.

They accordingly met, and elected one for their master and proprietor of their lands, and for the arbitrator of their controversies, saying to him; "Come, animal being, punish from among us those that are to be punished, and reward those with a gift that merit to be remunerated; from all the products of our lands we will pay you a certain rate, accordingly to a rule." Afterwards on both sides, they did accordingly. Since he was carried (or honoured) by a great multitude of animal beings, he was called *མང་པོས་བརྒྱུད་པ་* *Mang-pos bkur-va*; Sanscrit, *Mahá Sammata*, "Honoured by many."

Gautamas! At the time of *Mahá Sammata*, man was called by this name, "Animal being."

[The following five leaves (from 171—175) are occupied with an enumeration of the descendants of MAHÁ SAMMATA down to KARNA (*ཀ་ར་པ་རྩ་ཀ*) at *Potala* (*ལྷ་འདྲིའི་ཀ་ར་པ་* *Gru-hdsin** the harbour.) He had two sons, GOTAMA and BHARADHWAJA (T. *rNa-va-chan.*) The former took the religious character, but *Gotama* being afterwards accused of the murder of a harlot, was unjustly impaled at *Potala*, and the latter succeeded to his father. He dying without issue, the two sons of GOTAMA inherit, who were born in a præter-natural manner; from the circumstances of their birth, they and their descendants are called by several names; as, *ཡན་ལག་ལྷན་པ་* *Yan-lag-s,kyes*; (S. Angirasa,) *ཉི་མའི་གཤེན་པ་* *Nyi-mahi-gnyen*, (S. Surya Vāṇsa,) *Gautama*, *བློ་ཏྲམ་པ་* *Bu-ram shing-pa*, (S. Ishkwaku.) One of the two brothers dies without issue, the other reigns under the name of IKSHWAKU.

To him succeeds his son, whose descendants (one hundred) afterwards successively reign at *Potala* (*ལྷ་འདྲིའི་ཀ་ར་པ་*), *Gru-hdsin*. The last of

* The ancient *Potala*, or the modern *Tatta*, at the mouth of the Indus.

whom was བྱ་ཇམ་གྲིང་པ་ འཕགས་སྒྲེས་པོ་: Ikshwaku Virudhaka, (or Vidéhaka.) He has four sons, སྐུ་མད་འཕགྲོང་, འཇམ་ནི་, ལྷ་པོ་ཚེ་ འབྲུག་, and ལྷ་པོ་ལྷ་མོ་. After the death of his first wife, he marries again. He obtains the daughter of a king, under the condition that he shall give the throne to the son that shall be born of that princess. By the contrivance of the chief officers, to make room for the young prince to succession, the king orders the expulsion of his four sons.

They taking their own sisters with them, and accompanied by a great multitude, leave *Potala* (པོ་ཏ་ལ), go towards the Himalaya, and reaching the bank of the *Bhagirathi* river (སྐབ་ཀྱི་རྒྱུ་གཤིན་པོའ་ཁྲུང་ཆེན་པོ་) settle there, not far from the hermitage of CAPILA the *Rishi* (རྩ་དམུང་ལེར་མུ་ལི་བཞུགས་པའི་གནས་པ།), and live in huts made of the branches of trees. They live there on hunting; and sometimes they visit the hermitage of CAPILA the Rishi. He observing them to look very ill, asks them why they were so pale. They tell him how much they suffer on account of their restraint or continence. He advises them to leave their own uterine sisters, and to take themselves (to wife) such as are not born of the same mother with them. O great Rishi! said the princes, is it convenient for us to do this? Yes, Sirs, answered the Rishi, banished princes may act in this way. Therefore, taking for a rule the advice of the Rishi, they do accordingly, and cohabit with their non-uterine sisters, and have many children by them. The noise of them being inconvenient to the Rishi in his meditation, he wishes to change his habitation. But they beg him to remain in his own place, and to design for them any other ground. He therefore marks them out the place where they should build a town: since the ground was given to them by CAPILA, they called the new city *Capilavastu*. They multiply there exceedingly. The gods seeing their great number, show them another place for their settlement. They build there a town, and call it by the name of རྩ་མུ་བཞུགས་པའི་གནས་པ། *Lhas-bstan*, (shown by a god.)

Remembering the cause of their banishment, they make it a law, that no one of them hereafter shall marry a second wife of the same tribe, but that he shall be contented with one wife.

At *Potala* (ཐོཌ་ཐོཌ་) the king *IKSHWAKU VIRUDHAKA*, recollecting that he had four sons, asks his officers, what has become of them. They tell him, how for some offence His Majesty had expelled them, and how they had settled in the neighbourhood of the *Himálaya*, and that they have taken their own sisters for their wives, and have been much multiplied. The king, being much surprised on hearing this, exclaims several times : *Shákya ! Shákya !* Is it possible ! Is it possible ! (or

O daring ! O daring !) ཤོད་པ་ *phod-pa*, and this is the origin of the *Shákya* name.

After the death of *IKSHWAKU VIRUDHAKA*, རྒྱ་རྩམ་མིང་པ་འཕགས་སྤེས་པོ་ at *Potala*, succeeds his younger son རྒྱལ་སྤྱིད་དགའ་, *rgyal-srid dgah*, (he that desires to reign.) On his dying without children, the banished princes successively inherit. The three first have no issue; the son of མིང་གཟུག་མཆོག་, the fourth prince, is, *Gnag-hjog*, གནས་འཛོམས་. His son is སྤྱིམ་. His descendants to the number of 55,000 have reigned at *Capilavástu*. [An enumeration of the princes who reigned at *Potala* after *IKSHWAKU* follows, which is indetical with the list in Sanskrit authorities; the names being translated into Tibetan according to their literal meaning; as for *Mahá Sammata*, *Mang pos bkur-va*, greatly honored, &c.]

Here ends the narration of *MONGALYANA*. *SHA'KYA* approves and recommends it to the priests.

II.—*Second report on the Geology of Hyderabad.* By H. W. Voysey, Esq. Surgeon and Geologist to the Trigonometrical Survey of India, dated Secanderabad, the 28th June, 1820.

I had the honor of submitting a geological description of part of the dominions of His Highness the *NIZAM* to the *MARQUESS* of *HASTINGS* in June last, since which I have visited a considerable additional portion of the same country, including part of the Honorable Company's territory. I now beg leave to offer a more complete geological sketch of the country through which I have passed, embracing in a great measure the substance of the former report, but more systematically arranged.

The space included between the extreme points of my different journeys is about 3° of latitude and 5° of longitude, viz. from 16° to 19° N. lat. and from 77° to 82° E. long.: within it are four rivers, the *Godáveri*, *Kistna*, *Maujira* and *Moussa*, two of which may be ranked among the principal rivers of *India*, viz. the *Godaveri* and the *Kistnah*. The two first-named rivers take their rise in the Western Ghauts, and some of their tributary streams at their origin are only separated a few miles from each other. Their general course, is nearly south-east. The *Manjira* differs the most from that course, being forced to double on itself when it approaches the high land, commencing about thirty miles north-west of *Hyderabad*. The course of the rivers accords with that of the ranges of mountains, and the valleys through which they run.

Mountains.

The granitic part of this country may be called both mountainous and hilly, and in the plains and valleys are found elevations which are mini-

atures of the loftier ranges. These ranges are few in number, and remarkably interrupted and irregular, their extension inconsiderable, and their height above the level of the sea about 2,500 ft., most of them falling far short of that height. Single isolated hills and groups, with round and conical summits, are by far their most common features.

Although the complete isolation of these hills and groups first strikes the observer as being the prevailing character, on a closer examination it will be found that the apparently isolated hills are connected at their base by scarcely distinguishable elevations, pursuing the N. W. and S. E. direction, common to them and the larger ones.

They are extremely bare and rugged in their outline, and consist of piles of rock, one block being heaped above the other in irregular succession on an enormous mass of concentric granite. In the process of decomposition these form tors and logging stones of a singular appearance.

The hill on which the Fort of *Bhowánigarh* is built and that of *Mául Ali*, 2017 ft. above the level of the sea, may be taken as specimens of the isolated hills and groups; and the ranges of *Mulkapur* and *Golconda* as specimens of the continued. The only parts of the country which are entitled to the name of plains are those in the neighbourhood of the rivers, being formed by their inundations and therefore of small extent.

The above description applies to the greater part of the granite country : those ranges of granite however which run N. E. and S. W. from *Guntúr* to *Gondwána*, forming the pass of the *Kistna* at *Bejwára* and that of the *Godáveri* at *Pápkunda*, are of a different character; the ranges being less interrupted, more elevated above the plains, although not higher above the level of the sea, and altogether of a different structure. Their sides are very precipitous, and oblige the traveller to use his hands and knees for a considerable portion of the ascent.

Their outline is not at all rugged, and the logging stones and tors of the former granite are nowhere visible.

The Cavalry cantonment of BA'LARA'M, six miles N. of *Secanderábád*, is one of the highest inhabited villages of the granite country, and from thence to the northward, the country gradually decreases in height as far as *Menachpet* : the same takes place more suddenly at *Malkapur* to the eastward, and at *Patancherú* to the N. W. The city of *Hyderabad*, close to the walls of which the river *Moussa* runs, is by barometrical measurement 1672 feet above the level of the sea, and the cantonment of *Secanderabad* 1837, which agrees with Colonel LAMB-

TON's trigonometrical measurement within 19 feet. Colonel LAMBTON's observatory being 10 feet high, and the house where the observation was taken between 5 and 10 feet lower than the base of the observatory, the agreement will be much closer.

The outline of the basaltic trap hills is smooth and rather flattened with a few conical elevations in the range; or they consist of an accumulation of round hills with deep ravines intersecting and separating them. They are covered with long grass to their summits. Their course is the same with the granite they cover, but it frequently happens that no regular direction can be perceived.

The sandstone country and rocks are flat, the sides of the hills steep, with extensive gaps in the course of their range, at times nearly reaching to their bases; their direction is N. W. and S. E. or nearly so, and it is probable that they extend over a considerable portion of the S. E. part of *Gondwana*.

Rivers.

The rivers of India, and particularly the *Godáveri* and *Kistna*, are subject to great variations in the quantity of their waters dependent on the periodical rains. The small rivers are nearly dry in the month of May, and the channels of the larger contract to a fifth from their size in the middle of the rains.

I before mentioned that the tributary streams take their rise near to each other, and pass through a country of nearly similar formation, viz. basaltic trap, and discharge their waters into the sea within 60 miles of each other by several mouths, which like those of the Nile or the Ganges run through a delta formed by their own alluvium. Their waters are much discoloured in the rains, and deposit on their banks and throughout the whole extent of the inundation, which takes place more or less every year, a thick layer of black alluvial soil, called by Europeans "black cotton soil." These banks vary from 50 to 30 feet in height, the latter being the usual height of those of the *Kistna*. About 50 miles from their embouchure they both pass through the chain of granitic mountains which extend from *Gantúr* to *Gondwana* before mentioned.

The pass of the *Kistna* at *Bejwára* is much broader than that of the *Godáveri* at *Pápkonda*. This may be the cause of the more extensive inundations of the latter, since its channel is contracted from a breadth of two and one mile to two furlongs by the lofty and precipitous sides of these mountains. This defile constitutes the S. E. boundary of His Highness's dominions. Its extent from the last Nizam's village to the nearest Company's village is about ten miles, which space is uninhabited,

the banks or sides of the mountain being so steep as even to preclude communication in any other mode than by water.

The extent of the modern inundation varies from six to three miles on each side of the river, but judging from the distance at which the black alluvium is found from the banks of the river, these periodical floods have been more extensive*.

The last took place in the year 1816, and washed away houses and cattle in great numbers; and there are traditions of two others in the course of the last century, each greater than the last. I am not able to speak with so much certainty of the inundations of the *Kistna*; I have however seen the black alluvium covering the plain in which the diamond mines of *Purteil* are situated, extending six miles from its banks; also at *Shermahomedpet*, five miles N. W. of its bank.

These inundations are considered as important benefits by the inhabitants, and the produce of the land is proportionally increased after their occurrence.

Tanks.

The lakes I have seen are all artificial, and are found only in the granitic and sandstone country; they are usually formed by uniting two projecting points of low hills, which nearly separate the upper half of a valley from the lower, by enormous causeways of granite, or mounds of earth, which collect the different streams rushing from the hills during the rainy season, forming a sheet of water from three to ten miles in circumference.

This mode of retaining water artificially is probably coeval with the first increase of population in this country, as the small supply of water derived from wells would not be equal to the cultivation of rice, which is the only grain extensively produced in the granitic soil.

After the rains the loss they sustain from irrigation, evaporation, &c. is supplied by infiltration, nevertheless many become dry before the monsoon recommences. Those tanks which are neglected and no longer supply rice-fields are speedily covered with the large leaves and flowers of the *nelumbo indica*, *othelia alismoides*, and other aquatic plants: their waters acquire a noisome smell and unwholesome taste. The number of tanks and their state of repair afford a fair criterion of the prosperity of the country.

* From subsequent observations, I am inclined to believe that this alluvium or diluvium was the result of a deluge of water which found its course to the sea by the present opening of the rivers—and that they have done no more than form their beds in it.

• They are less frequent in the sandstone country, and the unirrigated cultivation is accordingly more abundant.

• In the basaltic trap they are rarely seen, and the irrigation of rice when cultivated is performed solely by wells.

Hot Springs.

There are two hot-springs. One called *Gondála* is situated in the sandy bed of the *Godáveri*, about two furlongs from its left bank, a few miles below the pagoda of *Baddrachelam*. It is covered in the rainy season by the river, but is left dry during the greater part of the year.

The bed of the river about one mile and a half wide contains granitic sand, above which appear rocks of granite and trap mixed in various ways.

The spring is situated close to these rocks. When I visited it in February, it was covered with sand, and we were obliged to dig in three places before we discovered the hottest part. Around this spot to the distance of 15 yards the temperature of a stick thrust into the ground was sensibly raised, and on digging to the depth of three or four feet, water was found hot, but of an inferior temperature to that of the central spot. Its temperature at sun rise was 139° , that of the others 120° and 130° whilst that of the air and river was 70° . The falling in of the land, the pit being about four feet deep, so evidently reduced the temperature, that it is very probable we should have found it much higher on digging deeper, which we were prevented from doing by the inconvenience the labourers suffered from the hot-water. The presence of sulphuretted hydrogen was sensible to the smell; but the impregnation was not strong enough to blacken a silver pencil case: the tissue of a slipper was slightly discoloured on being dipped into the water.

On evaporating 2880 grains, six grains of saline matter were left behind, consisting of sulphate of soda, common salt, and muriate of lime.

It is much resorted to from its supposed efficacy in curing cutaneous disorders. It is worthy of remark, that the rocks in the neighbourhood contain no iron pyrites. Its heat therefore cannot be ascribed to the spontaneous combustion of that mineral.

On the opposite bank of the river is a bluff rock of sandstone, through the crevices of which water infiltrates and is collected in small reservoirs, caused by the continued dropping on the soft stone. Its temperature at nine o'clock was 68° . I do not consider this to be the mean temperature of the place, since its latitude, 18° N. and height above the level of the sea not exceeding 130 feet, would make its mean tem-

perature much higher. It is called by the natives, "the cold spring," in contradistinction to its neighbour *Gondāla*.

About 30 miles to the N. W. of this place is the hot-spring of *Bangah*, situated in a valley surrounded by sandstone rocks. It is a pool of water, about 40 feet long by 20 broad and five feet deep. From the deepest part a number of bubbles of air or steam are continually ascending; there its temperature is 110° , but at the sides 100° . It holds in solution a small quantity of carbonate of lime. It is surrounded by loose blocks of a porous black limestone: the water is tasteless, and remarkably pure in other respects.

I have frequently received information of the existence of springs of water both in the granite, the trap, and the sandstone countries, but have always been disappointed in my search after them; as I have invariably found that the rills which flow down to the rivers are supplied by infiltration of water through the rocks, from the higher ground, and their temperature always that of the surrounding atmosphere. This perfectly accords with the structure of the country, and the absence of rain during eight months of the year. The hills being none of them high enough to intercept the clouds, and deprive them of their water.

The temperature of a well at *Beder*, 200 feet deep, was 77° in the month of March, and that of a well, 40 feet deep, at *Secanderabad*, 78° in November and in June: this is probably very near the mean temperature of both places.

Soils.

The fertility of the soils which compose the cultivated districts of the granitic part of this province would depend greatly on the facility with which the rock of which they are formed, decomposes, were not water the most important requisite in the cultivation of rice. The soil is of course siliceous, but varies as much as the granite rock itself, which will be described in another part of this sketch. Generally, it has few spontaneous productions. The rich valley of *Malkapur* forms an exception, and it may be said that usually the spontaneous fertility is in the inverse ratio of height above the level of the sea.

The following is an analysis of a garden soil at the cantonment of *Secanderabad*, which has not received much manure.

Specific gravity of soil 1.70. Four hundred and eighty grains contained; viz.

Of water of absorption,.....	10 grs.
Stones, consisting of quartz and felspar,.....	255
Vegetable fibre,....	2
Siliceous sand,.....	154

Of minutely divided matter separated by infiltration ; viz.	
Carbonate of lime,.....	7
Vegetable matter, destructible by heat,	7
Oxide of iron,.....	2.5
Soluble matter, common salt,.....	4
Silica,.....	20
Alumina,.....	8
	Loss 10.5
Total.	480.0

The soil of the basaltic trap country is generally very retentive of moisture, and accordingly those plants which do not require an artificial supply of water are its principal productions : such are cotton, *jován* (*ligusticum ajwán*), horse gram, *Zea mays*, *carthamus tinctorius*, *ricinus communis*, &c. &c.

The iron clay in the environs of *Beder* is very sterile, and is so porous that all water percolates through it to the substratum, which is basalt ; from this cause it is that the wells at that place are deep.

The sandstone soil contains a considerable quantity of clay, and is retentive of moisture ; irrigation is however employed for rice, and generally it may be said to partake of the nature of both the trap and granite soils.

Above all others that I have hitherto seen, that arising from the decomposition of the clay slate marked B. in the map, is the richest and most spontaneously productive.

On the tops of its mountains I saw the loftiest teak trees, and in its plains the most exuberant vegetation.

The black alluvium found on the banks of all the rivers except the *Moussa*, which takes its rise in granitic country, is of the same nature with that which covers the trap mountains from the decomposition of which it arises.

Rocks.

The description of the soils naturally leads me to that of the rocks, of the debris of which they are composed.

The granite is found of all shades of grey, from black to white ; the most predominant is reddish grey ; these colours depend upon the felspar and the mica, and on the hornblende, which often occupies the place of and accompanies the mica, and is with difficulty distinguished from it. Compact felspar of a greenish tinge is a very common ingredient, and in several places I have found carbonate of lime a constituent ; the quantity, however, is generally small, and only to be detected by its effervescence in acids. A tuffaceous limestone is found through-

out the granite in nests and beds ; my knowledge of it is yet too limited to decide on its nature.

The granite very frequently contains angular and rounded masses of a micaceous granite, which appear to have been enclosed in it when in a fluid state ; at times the edges of these masses are commixed with those of the containing rock, and at others the adhesion is so loose as to allow the mass to fall out, as the more easily decomposable matrix wears away. I have seen these masses, through the whole extent of the granite country ; and it first suggested to me the probability of the contemporaneous formation of the whole.

I may here observe, that the specific gravity of these masses is greater than that of their matrix, as is also their infusibility, from the greater quantity of mica they contain.

The granite of the *Godāveri* at *Papkunda* is never in concentric layers. It contains half-formed garnets and micaceous iron ore. The felspar of some specimens has a very pearly lustre : this mineral is sometimes wanting, and the rock then consists of quartz and garnets, with a few specks of micaceous iron ore.

At *Bejwāra* the granite is slaty (gneiss), with an eastern dip at an angle of 70 or 80 degrees ; the felspar is more abundant. In some irregular veins of earthy carbonate of lime, I found earthy grey manganese ore.

At *Gharībpet*, a few miles from *Palūnshah*, the rock which I believe to be a continuation of the *Kainikgiri* range and connected with the granite of the province, is a compound of mica, kyanite, garnets, quartz, and felspar. If the rock were at all slaty, its name would be mica slate ; it is however not at all schistose, but a solid mass of rock three hundred feet in height, and four or five hundred in length.

Trap veins.

The trap veins which run through this rock constitute the most remarkable fact in its history. They consist of hornblende rock, greenstone, greenstone porphyry and basalt, containing minute crystals of felspar. They are found in every part of the granite, and have generally the same direction, nearly E. and W., with a zigzag course of various length and breadth.

Some of them have been traced fifteen or twenty miles, their breadth varying from a few feet to 100, 200 and 300 ; at times their edges are commixed with those of the granite : the central masses affect a rhomboidal form, which in the course of their decomposition become rounded.

In a few instances I have seen these trap rocks in beds which do not appear to have any particular directions.

This was the case in the bed of the *Godáveri* near the hot-spring, also on the banks of the river, and 15 miles inland, near *Palúnshah*, and at the foot of the micaceous rock of *Gharíbpét*.

Sandstone.

The sandstone varies considerably in composition and colour. Its variations however occur principally in the neighbourhood of its junctions with the other rocks. Its most common cement is lithomarge, which is also found in it in nests and beds of various sizes, and of colour both white and reddish white.

It is thus found at *Jallikara Gúdani*, 20 miles N. E. of *Ellore*, at *Chintapet*, at *Palúnshah*, at *Mangapet* and *Tyellapúram*.

At its junction with the granite to the S. E. of *Hyderabad*, twelve miles from *Thatkúr*, it would be scarcely recognized as sandstone.

It there consists of a conglomerate, containing pebbles of quartz, felspar, a few scales of mica, and rounded pieces of a rock resembling the granite of *Pápkunda*, in a cement of indurated clay strongly impregnated with iron. It soon however changes to a rock, containing grains of sand cemented by lithomarge as before described.

The rounded pebbles of quartz, in some instances, form nearly the whole of the mass. It sometimes contains septaria of a black ferruginous sandstone of a curvilinear form, which project as the rock decomposes.

A few miles to the N. W. of *Buddrachellam* commences a range of flat sandstone hills called by the natives *Vindhaya*; they extend upwards of sixty miles on the right bank of the river.

Both white and grey sandstone were brought to me gathered at their bases.

At the junction of the sandstone with the granite at *Ramgiri* it contains crystals of red felspar and a few scales of mica. In no instance have I seen this sandstone stratified. The height of the highest flat range is about 3000 feet.

Basaltic Trap.

The basalt which covers the granite to the N. W. of *Hyderabad* at first appears only on the summits of some of the hills; the latter rock still occupying the valleys and forming the sides of the mountains. It afterwards gradually increases in extent until it covers it in all its parts, the granite re-appearing only in the beds of some of the rivers, and forming the base of some isolated peaks. It is sometimes found columnar, the columns being of all sizes, from a foot to a yard and a half in diameter, as at *Oudghir*, *Monegal*, &c. It varies from a very compact semi-crystalline rock, resembling hornblende rock, to a porous

basalt which passes into wacken, containing stilbite, mesotype, ichthyophthalmite, heliotrope, calcedony, green earth, quartz with crystals of calcareous spar imbedded, the form of which the quartz has taken, demonstrating that this mineral has been the last deposited. The wacken passes into iron clay, and in some places the basalt may be seen with the wacken and iron clay in the space of a few yards. The latter forms elevated table land at *Béder*, which is 2,359 feet above the level of the sea; it closely resembles that of the red hills at *Madras*, *Nellore*, *Singhirikunda* (in the two latter on granite), all on the sea coast, but in this instance rests on basalt. I observed in it plumb blue lithomarge, and pisiform iron ore.

On the basaltic hill of *Medkunda* I observed large masses of flint lying on the surface and deeply connected; also pieces of a siliceous stone, containing shells which had lost their carbonic acid: the external surface of these masses effervesced in acids. These shells belong to the genera *turbo* and *cyclostoma*, and living specimens are found in the beds of most of the rivers as well as on the rocks in their neighbourhood. The specific gravity of these stones varies from 1.90 to 2.00, that of the flint is 2.60. A few miles from this place I observed the same shells enclosed in small pieces of earthy limestone; they were lying on the basalt, which is here 2000 feet above the level of the sea and about 200 above the river *Manjira*: the base of the hill being granite, and the basalt not occupying more than 100 feet.

Quartz rock occurs in the granite in beds, as at *Pitlam*, *Gazypet*, and in the environs of *Hyderabad*: the rock in the neighbourhood of the latter is elevated 40 or 50 feet above the level of the plain through which it runs; its course is north and south, and its extent about twelve miles. It contains considerable quantities of amethystine quartz, which is not pure enough for the purposes of the lapidary.

The loose masses of quartz, as well as those which appear above the surface, have a rhomboidal form. This rock runs directly opposed to the greenstone veins, and intersects three of them. I have reason to believe that the trap passes through the quartz, although I have not yet distinctly observed it, except in one instance near *Hyderabad*.

Clay Slate.

The clay slate which is found to the eastward of *Hyderabad*, between *Byarām* and *Palúnshah*, is about 20 miles in breadth and perhaps 30 miles in length, with a north and south direction. One of its highest points, *Panch-bondal*, is 2600 feet above the level of the sea. The valleys contain sandstone, clay slate, and quartz rock; this latter is also found on the summits in veins and beds.

Some of the mountains exhibit marks of great disturbance : the dip of their strata is to the south-east, and on their summits the quartz rock and clay slate appear to be indiscriminately mixed. The chasms formed by these disturbances give passage to foaming cascades, the only sound which breaks the awful silence of their solitude.

The rock is generally indurated clay slate passing into flinty slate, containing drawing slate but no roofing slate.

On the banks of the *Kistna* between *Amrawatí* and *Warripilí* beyond which I have not traced it, and from *Warripilí* to within three coss of *Nacricul*, is found a limestone in horizontal strata.

When first seen it lies on the surface of the earth in large flat masses partly covered with alluvial soil ; its colour varying from a dirty white to a pinkish white, from which it passes into a compact black rock which is capable of receiving a good polish. It subsequently assumes a whitish green and pinkish grey, and on the banks of the river it is found of all these colours except the black. Veins of green hornstone are found passing through it, and at times small masses of red iron ore. It contains no petrifications.

It is well adapted for building, for sculpture, for mortar, and I believe for water cement. Large pagodas and forts built of it bear fewer marks of age than most of the granitic structures.

The town of *Dáchapilí* is entirely built of it, as well as a large pagoda and fort at *Warripilí*. The famous basso relievos of *Amrawatí*, for the first account of which we are indebted to Colonel MACKENZIE, are formed from this rock.

A pure lime is obtained from numerous veins of calcareous spar on the river bank, and I conceive the black limestone contains the requisite proportion of alumina and iron for making a good water-cement.

No inland carriage is required, since it is quarried on the banks of the river, and may be carried down at all seasons of the year to *Masulipatam*.

An analysis of one hundred grains of grey slaty limestone gave

Carbonate of Lime,.....	84
Alumina,	8
Iron,	4
Loss,.....	4

Grains, 100

Iron Ores.

I have hitherto seen no ores of iron in the granite. The sandstone and iron clay are the most productive. They consist principally of earthy brown and red iron ores, poor in iron, but easily smelted. The

modes of smelting are well known to be very rude, and have been frequently described*. On calculation I found that the price of their iron in its best state was double that of the best English iron at home. The ore from which the steel is produced, which goes by the name of the "Hyderabad steel," is the same with that described by Dr. Hlyne in his travels in India, p. 191. I have not yet seen the process of making it, but from a specimen which I found much inferior to the English steel in hardness, I should suppose it not to be the same as the Indian *wootz* so much valued at home†.

Diamond Mines.

On the banks of the *Kistna* and within reach of its inundations are the celebrated diamond mines of *Golconda*. It is probable they have been so named from their being the property of the sovereign of *Golconda*, which kingdom received its name from the celebrated hill fort and city called old *Golconda*, near the modern city of *Hyderabad*.

They are situated in a plain on the left bank of the *Kistna*, formed by its alluvium, and bounded on the east by a chain of mountains running nearly north and south, on the west by the river, on the north by the granite of *Sher-Mahomed-pet*, and on the south by that of *Bezwara*. In this plain a few peaks of granite of 15 or 20 feet in height are seen rising above the surface of the black alluvium, but none are found nearer the mines than one mile and a half. The mine situated nearest the hills is two miles distant from them. These hills consist of a mixture of quartz, felspar, hornblende, and mica, the latter in very small quantity; the hills near them at *Condapili* are of sienite approaching to greenstone, the hornblende being in the greatest proportion.

From the circumstance of these sienitic hills being surrounded by granite on all sides, I venture to suppose that they are merely a repetition of the phenomenon of the trap veins on a much larger scale, in this case forming mountains differing in their constituent parts, but not more than I have observed in other instances. The taluses of these mountains extend to a very short distance from their bases, and as I was not able to find in the rubbish of the diamond mines any substrata resembling them, WERNER's supposition that these rocks, which he calls trap from the examination of specimens, were the matrix of the diamond, will prove unfounded. This receives a further confirmation from the fact, that one of the mines near *Pulichinta* is situated on or near limestone, and the mine of *Malavili* 20 miles south-east of *Partaal* lies on granite and is surrounded by that rock.

* See Journ. As. Soc. vol. i. p. 150. † See ditto, p. 245.

Of the six villages situated in this plain, *Parteal* is the only one in which diamonds are sought for. There even no fresh excavations have been made for many years, and the workmen have been since employed in examining the old rubbish of the former excavations. They believe, in common with the searchers for diamonds in Hindustan, that the gem is always forming in the mine, although very slowly.

The village of *Parteal* presented a striking contrast to the Company's village we had just quitted: it was in ruins, and the inhabitants ill clothed and half starved in their appearance. I afterwards visited the mines of *Antior* one mile from the *Kistna*, *Barthemí Pandoa*, and *Malavilí*, but in none did I find labourers.

There is still a considerable quantity of ground unopened in all these mines: indeed the sides of the excavations, which have produced the finest diamonds in the world, still remain untouched. The want of capital, and the objections of the *zemindars* to a farther encroachment on the cultivated lands, may be the causes operating chiefly to prevent farther researches, together with the fact of the cheapness and plenty of the Brazil market.

The only stone common to all the mines I have visited, and which I understood to be indicative of the presence of the diamond, is the calcareous conglomerate*.

Garnets.

The garnet mine of *Gharibpet* is situated south of *Palánshah* about eight miles. As I advanced up the ravine, in which I noticed veins of granite and trap and sand composed of mica, garnets, kyanite, quartz, and felspar, large scattered masses of rock were strewed on each side, which had fallen from the summit. On the top of the immense mass of rock were several detached pieces, no doubt destined to fall as soon as decomposition shall have smoothed the way.

Accustomed to see garnets in mica slate in Scotland and elsewhere, I was disposed to call this rock by the same name, but I did not perceive in any one instance any thing like stratification.

I found it throughout composed of mica, garnets, kyanite, quartz, and felspar; in some specimens the kyanite was next in abundance to the mica. Veins of quartz containing kyanite were very frequent. The garnets, which were seen in great profusion on the surface of the rock, were generally of a very coarse kind, as well as those which I found strewed on the surface of the ground.

At the depth of eight or ten feet in the alluvium at the foot of the rock were found the precious garnets. The theory of crystallization

* See a paper by Dr. VOYSEY in the Asiatic Researches, vol. xv. p. 120.

proposed by Mr. METHUEN*, and founded on experiment, will serve to explain why the precious garnets are only found in the soil beneath the rock.

I conceive that in this instance, as well as many others I have witnessed, of crystallization, the small particles of garnet are brought together by molecular attraction; and by the temperature, which is nearly constant, the moisture and superincumbent pressure, crystals of the precious stone are formed.

In this mode I have seen felspar and zeolite recrystallized, at the foot of the rocks, as well as in the alluvium they afford by decomposition.

The garnets when collected are gently pounded, and the bad ones broken: those which survive the blows are reckoned of good quality.

The cheapness of these precious stones becoming greater every day, from the quantity found in all parts of the world, and the facility and exactness with which they are imitated rendering them of smaller value; the discovery of a fresh mine is scarcely worthy of notice.

I cannot close my present sketch without expressing how much I have been assisted by the kindness of Mr. RUSSELL, resident at Hyderabad, and of Mr. RALPH, a gentleman in His Highness' service, who was my fellow-traveller for three months in a difficult part of the country, which I might never have seen but through his aid.

III.—*Bactrian and Indo-Scythic Coins—continued.* By Jas. Prinsep, F. R. S., Sec. As. Soc.

The present plate introduces us to some of the coins of Doctor SWINEY's collection already alluded to in my last communication. It is as well to premise that all order of arrangement is out of the question where new objects are every day dropping in, and where the epoch of so many of our coins is not yet satisfactorily ascertained. Thus it happens that although headed "*Bactrian*," the last plate, as well as the present, contains coins of other dynasties.

Dr. SWINEY pursued a course very similar to that of Colonel Tod in forming his collection.—"The plan I have found most successful under favorable circumstances of locality, or where no one has already explored the same ground, (and I have followed it many years before I heard of Colonel Tod's eminent success in the same pursuit,) is this: upon the line of march I employ an intelligent servant, generally a Musulman tailor, to buy up old *pyse*, which the *banyas* in some towns are in the habit of putting aside as useless, perhaps from father to son, and which rarely

* See Journal of Science and Arts, vol. i.

see the light except on occasions of this sort. Out of some dozens procured in this manner for as many current *pyse*, a few may be sufficiently curious to reward the trouble of search. Such beautiful coins as Lieut. BURNES brought back with him from the Panjáb and Oxus are no longer to be procured in India; indeed ancient silver coins are of very great rarity compared either with those of gold or copper, and the only two Bactrian coins I have been so fortunate as to discover, were obtained out of the limits of our provinces."

I have not attempted to engrave any of the numerous sketches of his antiques which Dr. SWINEY has been so obliging as to forward, but have confined myself to those of which he has sent sealing-wax impressions, or paper casts made in the school-boy fashion (but not to be despised on that account), by wrapping the coin in several folds of paper, and rubbing the exterior with a key or hard blunt point.

Bactrian coins, Plate VIII.

Figs. 1, 2, and 3, are described at pages 311 and 313.

Fig. 4.—A small silver coin of Apollodotus, weighing 36 grs.

Obverse. Head with diadem and fillets, and a neckcloth, inscription circular, close but quite distinct; ΑΠΟΛΛΟΔΟΤΟΥ ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΚΑΙ ΦΙΛΟΠΑΤΟΡΟΣ. The introduction of the conjunction ΚΑΙ I do not remember to have seen on any other Greek coin.

Reverse. A standing figure of Jupiter, rudely executed, holding a thunderbolt in his right hand, raised, and a kind of shield in the left: from the arms depend two ends of a sleeve or scarf; on the right is a singular monogram, (No. 4. of the series at the foot of the plate,) differing widely from that of Colonel TOD's coin of the same king, (No. 6. of the same series.) The legend is distinct but illegible, and agrees in character with that upon many of the bull and elephant coins—(see WILSON's plates, figs. 3, 4, 31; TOD, figs. 11, 12, &c.)

The native who brought this coin to Dr. SWINEY stated that it was procured by him at a town called *Kaital*, in the *Sikh* territory, not far from *Karnál*.

Fig. 5.—A coin of Menander, agreeing in its general features with the last; weight 34 grs.

Obverse. A well executed and intelligent face, with the diadem; latter part of the inscription not very distinct ΜΕΝΑΝΔΡΟΥ ΒΑΣΙΛΕΩΣ ΣΩΤΗ(ΡΟΣ?)

Reverse. The figure supposed to be Jupiter in the last coin appears in this rather to be Minerva wielding the bolts of Jove, or it

may be a native warrior throwing a bundle of javelins or darts. The monogram (No. 5) resembles the last without the hook, (unless the hook below, as I at first supposed, forms a part of it); one half of the inscription consists of the same letters as appear on the coin of APOLLODOTUS: it must therefore be the native title equivalent to *Βασιλεως σωτηρος*.

This coin was purchased of a shroff in the bazar at *Subáthú*.

In favor of these two coins I may venture to repeat the remarks of Professor SCHLEGEL, on the equally valuable pair discovered by Col. TOD.—“These two medals are beyond all price, as much for their admirable preservation as for their extreme rarity and their importance to history.” And I shall make no apology for also translating the Professor’s learned commentary on that part of the Bactrian history connected with them, at length, as much more satisfactory than a partial gleaning or plagiarism of his remarks, which so well exemplify the use of numismatology in correcting the vagaries of historians.

“In the profound obscurity which envelopes the history of Bactria, we must cull with care all that can throw the least light upon it.

“We find only two passages in ancient authors which mention king APOLLODOTUS. ARRIAN, the reputed writer of the *Periplus*, says, ‘Αφ’ οὗ μέχρι νῦν ἐν Βαρυγάζοις παλαιαὶ προχωροῦσι δραχμαί, γράμμασιν Ἑλληνικοῖς ἐγκεχαραγμέναι, ἐπίσημα τῶν μετ’ Ἀλέξανδρον βασιλευκότων Ἀπολλοδοτοῦ καὶ Μενάνδρου. “For this reason even now ancient drachmæ are current at Barygaza [*Brigu-gácha* or *Baroach*], bearing, in Greek characters, the stamp of the kings who reigned after ALEXANDER, APOLLODOTUS and MENANDER.”

The two coins now brought to light, agree better with this passage from ARRIAN than those of Col. TOD, on account of their exact similarity, which would allow them naturally to be coupled together in speaking of them.

“The other passage concerning APOLLODOTUS is from the summary of the history of Trogus Pompeius, which is placed at the head of the abridgment of Justin. Prolog. lxxi.

“*Deinde, quo rege pugnante, Scythicæ gentes, Saranæ et Asiani Bactra occupavêre et Sogdianos. Indicæ quoque res additæ, gestæ per Apollodotum et Menandrum reges eorum.*”

“The printed editions have *Apollodorum*, which was corrected by the learned and judicious BAYER, on the authority of the *Periplus*. This reading is now fully confirmed by a medal (two), an authentic and public monument. VAILLANT and LONGUERUE suspected a corruption of the text, and sought to correct it in another way. They thought that the name of APOLLODOTUS, the historian of the Parthian and Bactrian kings, had been confounded with that of a king, and LONGUERUE proposed to read *ex Apollodoro, gestæ per Menandrum et Eucratidam, reges eorum*. This is not correcting but disfiguring arbitrarily an ancient text; and yet the latest editor of JUSTIN in France, M. LEMAIRE, recommends this unwarrantable conjecture!

"BAYER, however, while he reinstates APOLLODOTUS, disputes his title to the kingdom of Bactria, which Col. TOD again vindicates with reason. BAYER would make him one of those Greek kings who, at that epoch, reigned separately over a part of India, such as DEMETRIUS, son of EUTHYDEMUS. This is in the first place contrary to the text of TROGUS POMPEIUS: for the word *eorum* applies to *Bactra et Sogdianos*. The coin confirms this refutation, for by what motive should a Greek king, not having possession of Bactria, put a legend in Bactrian characters on the reverse of his coin? I call them so, without prejudice to the question of the language to which they may belong. Certainly they are not Sanskrit: they have a strong resemblance to those on the early Sassanian medals. The credit of decyphering them is reserved for scholars acquainted with Zend and Pehlevi.

"To escape from this objection, we must suppose that APOLLODOTUS reigned in the eastern provinces of the ancient Persian empire, south of Bactria. The medal of DEMETRIUS, son of EUTHYDEMUS, discovered by the Baron MEYENDORF, bears a Greek legend *βασιλέως Δημήτριου*; the empire of India is designated by the skin of an elephant's head with which the portrait of the prince is adorned.

"APOLLODOTUS therefore must be admitted among the kings of Bactria. The celebrated VISCONTI has endeavoured to assign his probable place in BAYER's Chronological Canon of Six Kings, the dates of which are however mostly conjectural: he places him after EUTHYDEMUS" (see p. 315), "and both the authorities quoted above agree in placing him before MENANDER. Now MENANDER certainly reigned between EUTHYDEMUS and EUCRATIDAS; but VISCONTI will not allow the latter to follow MENANDER directly: he makes a place between their reigns for HELIOCLES, whose name is only known from one medal bearing the inscription *βασιλέως Ἡλιοκλέους δικαίου*, and pronounced by MIONNET to be of Bactrian fabric, merely from analogy to other coins of the same locality—an argument by no means conclusive. When a coin of HELIOCLES shall be discovered in India or Tartary, we may grant his title to the Bactrian throne."

"It is difficult to assign the exact limits of the Indian dominions of the Bactrian monarchs, or of their contemporaries, who reigned in India itself. The ancients use the word India vaguely, and sometimes make it comprise the Persian provinces north-west of the Indus. The conquests of the Bactrians may have been made in two directions:—one, towards the east by the *Panjab*, and onwards; the other, by following the course of the Indus. The expedition of SELEUCUS Nicator was directed towards the Ganges; by his treaty with CHANDRAGUPTA, king of the *Prasii* (people of the East), he gave up some provinces, and received a number of elephants in exchange. It is probable that the first kings of Bactria, on declaring themselves independent, took possession of what remained of ALEXANDER's conquests in the *Panjab*." [Dr. SWINEY's coins confirm their domination there, as far as the presence of medals can do so.] "At any rate, the third king, EUTHYDEMUS, in his treaty with ANTIOCHUS the Great, by which treaty his independence was acknowledged, gave up all his elephants. This proves two points: first, that EUTHYDEMUS had provinces, or at least subjects in India proper; second, that his rule was not extensive, for the elephants were few in number; added to those given by SOPHAGASENUS to ANTIOCHUS, they made but 150, whereas SELEUCUS received 400 from CHANDRAGUPTA.

"ANTIOCHUS' expedition was brilliant, but it procured him little solid advantage beyond the acquisition of these war elephants. After his campaign against EUTHYDE-

MUS and SOPHAGASENUS he repassed the Indus, and returned by way of Arachosia and Carmania to the western seat of his empire." [Was it after this expedition that he struck the coin represented in fig. 2, depicting the stern of a boat of the river Indus?]

"EUTHYDEMUS may have profited by the distance of ANTIOCHUS, and the decline of his strength, to deprive him of the provinces situated along the Lower Indus. It is certain that DEMETRIUS reigned there, I think, first as governor in the name of his father;—afterwards as an independent king. DEMETRIUS did not succeed EUTHYDEMUS in Bactria: his absence perhaps allowed his competitor to supplant him. If DEMETRIUS had not been in possession at the death of his father, with what force could he have conquered these vast provinces, when the army of Bactria was at the command of a rival? It is he, no doubt, who founded the city of *Demetrias* in Arachosia, the name of which is preserved in the geographical work of ISIDORUS. Thence his dominions extended to the Delta of the Indus.

"TROGUS-POMPEIUS ascribes exploits in India to APOLLODOTUS and MENANDER; STRABO also to the latter. Their conquests then must have been towards the *Panjáb*, since they would have come into contact with DEMETRIUS on the south; and there is no mention of war between the Bactrians and this king of India until the end of the reign of EUCRATIDAS. STRABO says expressly that MENANDER passed the *Hyphases* and penetrated to the Jamna. [Ἐίγε καὶ τὸν Ὑπανὴν διέβη πρὸς ἔω, καὶ μέχρι τοῦ Ἰσαμὸν προῆλθε. lege Ἰασίην et Ἰαμανοῦ.]

"This authorises our extending his kingdom to *Mathura* or even *Baitasor*, (where Col. Ton's coin was found.) The probability is, that it included the kingdom of *Lahore*; for since STRABO says that MENANDER was the first to penetrate so far, his predecessor's rule of course must have been more limited."

PLUTARCH bears testimony to the excellent character of MENANDER as a sovereign;—"a certain king, MENANDER, who had reigned with justice over the Bactrians, having died *in camp*, the cities in common had the care of his funeral rites, but afterwards contended for his ashes; they at last divided his remains equally amongst them, and agreed that monuments to him should be raised amongst them all*." May not this singular passage have had its origin in a confused account of the monuments raised by the Buddhists to preserve the relics of their lawgiver, of which one at *Manikyala* seems to have been founded immediately after the Bactrian monarchy was upset, and while the communication of those countries with the west was still perhaps maintained†? But to return to M. SCHLEGEL's epitome:—

"We know nothing of HELIOCLES, if indeed he ever reigned in Bactria. But as EUCRATIDAS was the first to assume the distinction of *great king*, it is natural to suppose that he aggrandized the empire. He may have conquered *Ariana*, which STRABO says belonged to Bactria.

"For the war between EUCRATIDAS and DEMETRIUS, king of India, we are reduced to the unsatisfactory notice of JUSTINUS, according to whom DEMETRIUS was the aggressor. EUCRATIDAS, at first besieged, and in great danger, saved himself by his valour, and finished by despoiling his adversary. In his retreat,

* Major Tod on Bactrian Medals, Roy. As. Res. I. 330. † See page 315.

after terminating this war, he was assassinated by his son. BAYER thinks that this DEMETRIUS is the same who in his youth negociated the peace for his father EUTHYDEMUS with ANTIOCHUS. However, the great age to which he must have attained is a staggering objection. One may reconcile probabilities by supposing that a son of the same name had succeeded to DEMETRIUS's throne.

"The existence of the parricide of EUCRATIDAS is well established; but his name is unknown, and it is uncertain whether he enjoyed the fruits of his crime. King EUCRATIDAS II. therefore, in BAYER's catalogue, rests only on a double conjecture.

"Thus end the Bactrian kings hitherto known. The latter history of the dynasty is enveloped in darkness yet thicker than the rest. JUSTIN attributes its destruction to the Parthians; the author of the summary of TROGUS-POMPEIUS to the Scythians; both quoting the same authority. It appears then that both these nations took part in it, but that the Scythians remained in possession.

"In a fragment of DIODORUS, or rather in an extract by PHOTIUS, it is said, that one of the Arsacidæ (no doubt the Sixth, MITHRIDATES I.) penetrated as far as India and seized the kingdom of PORUS, i. e. of the country between the Hydaspes and the Acesines. BAYER says with reason that the Greeks, wherever they allude to India, imagine a PORUS;—but in this case the historian seems justified, for we see that the Bactrians possessed not only that province but even beyond it. By BAYER's calculation, MITHRIDATES I., king of Parthia, must have survived EUCRATIDAS by seven years, but these dates are purely conjectural. At any rate, it is after EUCRATIDAS' death that these conquests must have been made: the war between him and DEMETRIUS would not have taken place had the Parthians occupied the intervening provinces. EUCRATIDAS was assassinated when in the height of his power:—it is then after his death that the decline of the empire commenced. M. DEGUIGNES, from the Chinese historians, fixes the epoch of its destruction in the year 125, B. C. The king or kings who may have reigned in the interim are yet unknown—perhaps they may be brought to light by Col. TOD's discoveries."

The above condensed and critical sketch of the latter Bactrian kings contains all that is known of them, and leaves us to fill up blanks only as fresh matter may be elicited through the labours of the antiquarian in this fruitful field. M. SCHLEGEL felt pride in adding two cognomens to his two kings: Dr. SWINEY's coins have already increased their majesties' titles; giving to MENANDER the common appellation "saviour;" and to his predecessor, in addition to the same title, the respectable appellation of PHILOPATOR, "loving son." This latter title is of more consequence than might at first be suspected, for unless his father were of kingly dignity, he would not have been mentioned: and it is more than probable that his son succeeded him peaceably. But we have no knowledge who the father was, since DEMETRIUS is the only recorded son of EUTHYDEMUS. We may suppose him to be sure a brother—perhaps a younger one,—a favorite—"a gift of the gods," as his name implies; and this might account for the deputation of the rightful heir to a distant province: but it is wrong to hazard conjectures upon points of such remote diplomacy!

Figs. 6 and 7.—Two square copper coins resembling in form fig. 7 of plate VII. weight 102 and 121 grs.

Obverse. A figure, apparently female, holding a cornucopia on the left arm: the other indistinct; legend in parallel lines, and evidently Greek, but only partially legible: the word *BA* *ΣΙΑΕΩΣ* commences both of them.

Reverse. The Indian Bull with its hump, encircled with the unknown character. Below, in both coins, the letter sigma, *Σ*, or a symbol of that form.

One of these coins was found at *Machwarra*, a small town near the *Satlej* river, between *Ludiána* and *Rúpar*; the other in the bazar at *Bussy*, on the road from thence to *Simla*. Dr. SWINEY considers them to be not only similar, but of the same die. It is not possible to do more than ascribe them to the Bactrian dynasty generally.

Fig. 8.—This small copper coin, from the neighbourhood of *Seharanpúr*, is classed among the Bactrian coins by Dr. SWINEY, from the similarity of its monogram to that of fig. 4. The legend also appears Greek: the obverse has a warrior with a bow? and the reverse a lion, panther, or *singh*, which connects it with one class of the Hindu coins.

Figs. 9, 10.—I have introduced these two of Doctor SWINEY's Bactrian-horsemen, or *EUCRATIDES*,* coin*, because the head is in better preservation than usual, and a letter or two more of the legend can be added to the scanty list hitherto elicited; thus on fig. 9, we have *ΣΩΤΗΡ ΜΕΓΑ* .. and on the other *ΜΕΓΑ ΒΑΣΙΛΕΥΣ*, "the great king," quasi *Mahá Raja*. As far as the specimens hitherto discovered can prove it, the nominative seems to be used in all the coins of this type, instead of the genitive, as usual on Greek medals: the terminations are also corrupted; all which circumstances tend to pronounce these coins to belong to the last princes of the race, as conjectured in ascribing them to *EUCRATIDES*.

Fig. 14, is a small coin supposed to have Greek characters, but undecipherable.

Figs. 16, 17, 18, are drawings of three small copper coins procured by Lieut. BURNES at *Manikyála*, which differ in some particulars from those already made public, and are on that account, rather than as leading to any fresh observation, now inserted. Fig. 16, belongs, from the side figure of the female, stooping, and the monogram or symbol, to the *Ka-*

* See Plate VII. and page 314.

niska group. Fig. 18, a man sitting dressed in the Brahmanical *dhoti*, accords so far with No. 1 of Mr. WILSON's plate, a gold coin dug out of the tope at *Manikyala* by General VENTURA. Fig. 17, is of a novel type, but the coin was in too imperfect a state to permit an accurate development of the figures.

Hindu Coins.

From the coins of Bactria a transition is easily traced through the dark period of the Indo-Scythian or Buddhist dynasty, to which numerous coins have been allotted upon such degree of internal evidence as their appearance affords, to the coins of the Hindu Princes of Central India, *Andhra*, *Rajputana*, *Kanauj*, *Indraprestha*, and perhaps *Magadha* or *Behar*. I have on a former occasion ventured to doubt* whether any native coin, properly so called, had circulation in India anterior to the incursion of Alexander. In none of the ancient books† of the Hindus is mention made of coined money. The word *suverna*‡ or gold, which occurs frequently in the *Purānas*, is supposed to mean a lump of gold of a fixed weight, such as is still current in Ava or China. Mr. H. T. COLEBROOKE states§ on the authority of MENU and other authors, that the *suverna* (*carsha*, *arsha*, or *tolaca*) was equal to 16 *mashas*. If the *masha* was as now about 17.4 grains only, this would certainly make the *suverna*|| small enough to admit of a doubt whether it did not bear some stamp: on the other hand, small lumps of gold called *phātang*, of a smaller weight and value, and without stamp, are still brought from the hills, and passed as cash in the purchase of goods in the plains. Again, the great analogy which is observed between the earliest Indian coins introduced to our notice by modern research, and those of the Macedonian colonists, is a very strong argument in favor of the supposition that the art of die-cutting was introduced at that period; and the employment of Greek workmen may reasonably account for the continuance of Greek legends where otherwise they would have been little expected. A further direct and incontestable proof of their connection is derived from the similarity of the

* Journ. As. Soc. I. 394.

† The Raja Taringini, a comparatively modern work, mentions the *dinar*, a Persian gold coin.

‡ As. Res. V. 93.

§ See Mr. RAVENSHAW's note, page 266.

|| Major WILFORD, and many as inveterate etymologists, might have derived our English *sovereign* from this word, had it chanced to have been current at an earlier period than is assigned by our mint annals for its introduction, namely, EDWARD IV.'s reign, A. D. 1489.

monograms or symbols visible upon most of them. I have inserted at the foot of the present plate such of these as occur in the coins before us. Most of them may be found on the Greek civic coins of the Hunterian cabinet at Glasgow; those upon the genuine Greek coins are evidently cyphers or compounds of Greek letters; either numerals marking the date, or initials of persons connected with the mint.

Monogram 1 appears upon a coin of DEMETRIUS of Syria (plate v.), and may be compounded of A T, symbolical of Antioch, the place of coinage: it is No. 67 of COMBE's Hunterian Catalogue. *Mon. 2*, on ALEXANDER's coin, (53 of COMBE,) may be A, and may stand for one of the numerous cities of this monarch's name. The third, (plate vii, fig. 1,) is evidently formed of the Greek letters P E, being perhaps the date (105 of the Syrian æra, or 206 B. C.)*, subjoined by A, betokening the locality. The next four (4, 5, 6, 7) occur in the coins of APOLLODOTUS and MENANDER (86, 216, and 326 of COMBE). Colonel TOD supposes the latter two and fig. 9 to be formed of numeral letters, but the combination of units is pronounced to be inadmissible. 8 and 9 appear on the coin of the last Bactrian monarch, "the great king." They are not found in COMBE: but the latter may be a combination of the letters O, T, H and E. 10, 11, and 12, having four prongs and the ring below cut open, belong to the supposed Kaniska coin, and all the coins of the raja and bull, and raja and elephant type. These can no longer be interpreted as letters, though evidently imitated from the foregoing. *Mon. 13* occurs in one of Colonel TOD's coins of the same class, with the running figure (13 of 3rd series), but it may probably be an imperfect impression of the foregoing symbol. From monogram 12 to the lozenge form of 14 is but a slight transition, and thus we pass to a wholly different class of coins, ascribed by Col. TOD to the *Pandu* dynasty, because the inscriptions are in the same character which is found wherever the *Pandu* authority existed;—in the caves, and on the rocks of *Junagur*, *Girnar*, on the pillar of victory in *Meywâr*, and on the columns of *Indraprestha* (Delhi) and *Prayâg* (Allahabad).

These coins are decidedly the most ancient of Hindu type which are known, and yet being of pure gold they are generally in a perfect state of preservation, and the characters, though unknown, are very clearly defined; many of them resemble the Tibetan form of Sanskrit. Most of them may be recognized in the inscriptions (or descriptive titles) over the sculptures at *Mahâbâlipuram*, described by Mr. GOLDINGHAM

* If so, this coin should belong to ANTIOCHUS the Great, and not A. THEOS as supposed in page 312, from his cognomen *Epiphanes*.

in the As. Res. V. page 79 : and as these sculptures are said by tradition to represent the personages and acts of the *Mahābhārat*, the value of some of the letters may perhaps be hereafter recovered. In point of age the coins can only belong to the *Maurya*, the *Sunga*, the *Kanwa* or the *Andhra* dynasties of Mr. WILSON's catalogue (315 B. C. to 428 A. D.)

Fig. 15 is copied from a gold coin, presented to me by Captain WADE, who discovered it near *Ferozpūr* : it agrees precisely with figs. 5 and 7, of Mr. WILSON's plate ; the former of which, stated to be taken from a drawing of a coin in Col. MACKENZIE's collection, seems to have been reversed by the artist, to assist the engraver, and inadvertently retained in that position. Every letter of the legend is identical in the three coins.

Fig. 13 is from the sealing-wax impression of a coin, belonging to Dr. SWINEY : it corresponds precisely with No. 6 of Mr. WILSON's plate, having the *tirsul* or trident of *SIVA* in lieu of the bird of *VISHNU*.

These two coins are of the description just alluded to. They have been found at *Agra*, *Mathura*, *Ujayin*, *Ajmir*, and even in Bengal. Mr. WILSON possesses one found in a tank in the *Huglí* district. The mixture of emblems on these coins might almost persuade one that they were forgeries, but that no two have hitherto been seen identically the same, and it would be manifestly impossible to forge a new die for each, especially when their price is little beyond the value of the metal. The female on the *reverse* sometimes sits on a well formed chair or settee, sometimes in the Indian fashion on a lotus flower, at others like *DURGA* on a lion* ; she holds a cornucopia in the left hand, in the right a scarf or ribband : a glory encircles her head ; her left knee is bare.

The *obverse* represents a king clad in a coat of mail, and with scale armour on the legs ; where the coin is worn, (as in fig. 15,) the dress exactly resembles the modern coat and trowsers. The head dress in fig. 13 has a resemblance to the Sassanian or Persian cap. The left hand is invariably raised, as if holding a spear : the right is extended as if placing an offering on a small fire altar. This hand is more clearly defined in fig. 15, than in any coin of the class I have seen ; and it may be questioned, whether the action is not rather that of plucking a flower, for an artist would hardly represent the hand in so hot a position, were the object beneath a fire altar !

* Vide Col. TOD's plate.

As another anomaly in these coins, it may be remarked that the letters on the left of the prince, in fig. 15, are identical with the Tibetan trilateral compound ལྷ *spy*, pronounced as *ch* or *sh*, with the inherent short vowel *a*, *spya* or *sha*; this combination forms no word in the Tibetan language, but with the vowel sign *i* (*shi*) it would signify "generic" or "general," as ལྷི་པོ་ནེ་མོ་ *spyi-dpon* (pronounced *shi-pon*) viceroy, or governor general.

Now the Tibetan alphabet, according to Mr. Csoma Köröshy, was only formed as a modification from the Sanskrit model in the seventh century of our æra, up to which period it were difficult to conceive that the characteristic monogram of Bactria should have been preserved. The two first letters of the side inscription also resemble the Tibetan རྩ་ *prá*, or if the antecedent dot be an *r*, *prá*.

On the right hand, in fig. 15, is a standard resembling in some sort a Roman eagle; it is probably the GARURA, or bird of VISHNU, and if so, is a proof of the connection of this coin with the ascendancy of the Vaishnava sects.

Of this peculiar class of coin, the plates in the Asiatic Researches afford numerous varieties. I now pass to another type, more recent perhaps by several centuries, but more rare than the preceding. The legends are here decidedly in the *Devanāgarī* character; yet the devices still bear a near analogy to their Grecian prototypes: the horseman, the bull, the lion, the seated figure, are revived with variations of dress and attitude, but it seems to have been contrary to the feelings or taste of the country to represent the human face, or perhaps the artists found themselves unequal to the task. Mythological subjects were better suited to the Hindus. The bull of SIVA, the Singh of DURGA, the Garura of VISHNU; GUNESH, HANUMAN, and similar devices, predominated until the latest period in the coins of Southern India and Ceylon*; or until the progress of Mahomedan conquest interdicted the privilege of coinage to the tributary Hindu princes.

From the desultory mode in which materials are collected for my plates, and from a wish to avoid delineating any that have already appeared in print, it is impossible for me to give a connected train of Hindu coins, and the student must refer to the plates in the As. Res. vol. xvii, for more ample information. The medley of types once collected and preserved however may eventually afford the means of a proper classification, although it cannot be attempted in the present state of our scanty knowledge.

* See plates III. IV. As. Res. XVII. and Mr. WILSON's remarks on the *Ramatanakas*, *Garada-Mudras*, &c.

Fig. 11 is an unique coin in Doctor SWINEY's possession. I have a sealing-wax impression, from the sharpness of which I conclude the original to be of gold.

Obverse. A horseman mounted and holding a spear with the right hand: the horse is ornamented with trappings in the native style. A curious scroll or symbol appears in front.

Reverse. SIVA's bull kneeling in the attitude of the images of NANDI in the temples. He is also clothed in ornamental trappings. Above are characters which seem to form the words श्री समग्रदेव *Sri Samagri deva* in ancient Nagari; the व written प is met with in one of the inscriptions decyphered by WILFORD, As. Res. IX. 104. No such name as *Samagri deva* occurs in the catalogues of Hindu dynasties of Central India or *Magadha*, but the import of the words may perhaps be understood as an honorific appellation, समग्र signifies "whole, entire." Were it possible that the fourth letter were an old form of न्न we might ascribe the coin to *Samanta deva*, the first of the Ajmir princes, who reigned, according to WILSON, in A. D. 500. But such a conjecture is not warrantable. WILFORD says, the titles *Sri* and *Deva* were assumed by the descendants of CARNA, as "SRI CARNA DEVA*," &c. We may therefore ascribe this coin to the *Andhra-jatiya* or *Andhra-bhritya* dynasty, some time anterior to the Muhammedan invasion.

Fig. 12.—Two copper coins of this die were brought by Doctor J. M. BRAMLEY, from Nipal, in a collection of the coins of that country; and I have inserted a drawing of them here, both as a fair pledge that other ancient Hindu coins are forthcoming in that hitherto unexplored region, and as furnishing some very legible characters in a class of coin of frequent occurrence, both in gold and copper. The lion or *Singha* on the reverse agrees with fig. 8: and with fig. 12 of plate vii. The sitting female figure on the obverse may be identified with figs. 1, 11, 12, 13, 14, 16, 17, and 40 of WILSON, and with the fourth series of *Top*; the characters are however of a different class, the क for instance, like that of fig. 14, in the last plate, more resembles the Bengalee form क, and is found on ancient grants and inscriptions, between the 5th and the 12th centuries. The nail-headed character is noticed by Col. *Top*, as predominating in all the inscriptions of the *Mauri* Princes of *Chitore* from (S. 465 to S. 1191) A. D. 409 to 1135.

* As. Res. IX. page 104.

PL. VIII

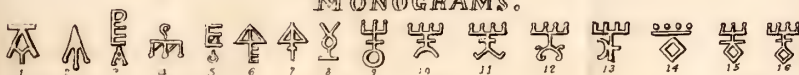
BACTRIAN COINS.



HINDU.



MONOGRAMS.



IV.—*Note on the Zoology of the 2nd Part of the Transactions of the Physical Class of the Asiatic Society of Bengal.*

In India, as in almost every other country of the civilized world, natural history, and more especially that part termed Zoology, has been of late years making rapid progress. And surely there is no country better situated than Bengal for becoming celebrated for the number and extent of its collections, and the rareness of the specimens which may compose them. For, fertile as may be the regions of South America in the productions of animated nature, that field has been repeatedly traversed by the most celebrated men of science in modern times; and, many well qualified and observant men, have, at different periods, favoured the world with their researches, made during a long residence on that continent. But India has not till now been viewed, by Englishmen, as the rich mine of the treasures of science it really is; and though foreign nations have sent out able naturalists to travel through the country, and to stretch forth their hands to all they could seize in their line of march; yet, the very nature of a travelling zoologist's occupation is such, as to prevent him from snatching at more than a few of the gems on the surface of things. He may collect and preserve; he may take home and classify: but much is set down in haste, much is forgotten; and he cannot become the observer of nature and all her secrets: while the manners, the habits, and the various interesting points of character, only to be developed by a long and intimate acquaintance with the animals he meets, must be to him unknown. These can only be known through the labours of men, not better qualified, but more favourably situated for the matured studies of zoology than himself.

Sensible of this hiatus in the labours of travelling naturalists, lovers of natural history have established menageries and aviaries at home: to make up, so far as close intercommunion with animals in confinement can make up, for the deficiency of knowledge, felt after all had been gleaned from books and collections. But natural history must be pursued through tracks different from those of the casual observer of wild animals in foreign countries; or, of the closet naturalist, who views them in a state of degradation, with broken spirits and ruined health, the sure concomitants of slavery in the brute as in man. A true naturalist must go forth into the wilderness. He must follow the objects of his much-loved science into the depths of the forest, to their native haunts, with the intent to observe rather than to destroy: and there, undistracted by other thoughts, and elevated by the magnificent scenery around him, he beholds their caresses, or their cruelties;

their force or their stratagem ; and feels that nature is now unfettered ; that they, like himself, are free.

How different is the state of mind of the man so situated, from that of him who only looks through the bars of a dungeon upon the miserable animals confined within. One views nature with the eye of a classifier alone, anxious to find out some petty point of distinction, some little difference upon which to found a genus ; the other with the enthusiasm of a lover. One strives to bend her to his system : the other would embrace her own ; nature to him is all in all, and system but valued as an interpreter of nature.

Systems, menageries, collections, however, have their value, and that value is great. To the naturalist of nature they serve, in after-days, to recal vividly to his mind recollections of the past. To others they offer a portion of science, that otherwise they could not attain.

Mr. HODGSON, author of six of the sixteen papers in this second part of the 1st volume of the Transactions of the Physical Class of the Asiatic Society, unites the advantages of the travelling and sedentary naturalist. Fixed upon the most stupenduous mountains of the world, and in a situation of political power that rarely falls to the lot of the friends of science, he has opportunities of doing great things for that branch to which he has devoted himself. Much may fairly be expected from him ; and to do him justice he certainly is not inclined to be idle.

The first of Mr. HODGSON's papers belong to Ornithology ; the portion of zoological science, perhaps of all most generally attractive. The system he follows is that laid down in the 1st volume of the Zoological Journal, (a work no naturalist should be without) by Mr. VIGORS, Secretary to the Zoological Society ; and which, though perhaps the best devised by English naturalists, is replete with the faults of the MACLEAY school. The generic divisions are sometimes founded upon doubtful or minute characters, and there is occasionally a good deal of squeezing to make them fit. Whilst, above all, there is observable in this school an affectation of perfection ; a presumption of knowledge ; which with the limited acquaintance with nature man must ever be confined to, appears totally unjustifiable to every one, not seduced by the language in which its views are detailed ; or willing to surrender his judgment to such great names as those of MACLEAY, VIGORS, and HORSFIELD. It is however the less necessary to dwell upon this, as the circumstance has not escaped the notice and the censure of some late continental writers : by whom the system has not been estimated so highly as was contemplated by its patrons and founders.

The first bird Mr. HODGSON describes under the name of *Aquila Nipalensis*; and he has noticed the deviation from the type of the genus *Aquila*, in the lunated form of the nostrils. There is also another point of deviation in the length of the wings, which he describes as wanting three inches, or nearly one fourth of the length of the tail. In the true eagles the wings are equal in length to the tail, "leurs ailes sont aussi longues que la queue," says CUVIER; and it is therefore not improbable that this may be one of those species which form the inosculating links between differing genera. Whether or not the species be a new one, can only be decided on the authority of Mr. HODGSON; for he has omitted to state the changes which take place in its plumage, during its passage from the young to the adult state; or the probable age of his specimen. And without these points being ascertained, the most experienced ornithologist may be mistaken in birds of this tribe.

The *Circæus Nipalensis* is rightly referred to that genus. It is not probable that SHAW has erred in placing the *Falco Bacha* in the genus *Cymindis*; distinguished as that genus is from all others of the eagle kind, by the remarkable characters of its bill. However the *Falco Bacha* is said to have been found in India and Java, and Mr. HODGSON's description of his bird agrees with it in several respects: nor is it unlikely that an African species should also extend to India. But then the difficulty still remains as to its being placed by SHAW in the genus *Cymindis*; with the generic characters of which, Mr. HODGSON justly says, it does not at all agree.

Our author, like all others who have gone before him, seems to be a good deal puzzled with the family of *Laniadæ* or *Laniidæ*, as it is termed in his paper. The genus *Dicrurus* was instituted by M. VIEILLOT on account of the forked tail of the species known to him. But the danger of giving a generic name on so trivial a distinction, soon became manifested, by the discovery of other species whose tail is not forked. This, among other things, has contributed its portion to throw the family into confusion. And Mr. HODGSON, or any other naturalist, would do a signal service to the cause of natural history by making a complete monograph of the whole *Laniadæ*: and (the measure is a strong but necessary one) fixing the old names or new-naming every species.

The other bird mentioned, "which bears a strong general but not particular resemblance" to the former, appears to be the same species as one sent to the Asiatic Society from Midnapûr by Assistant Surgeon J. T. PEARSON, in February 1830, and which he also referred to the genus *Dicrurus*. "I am of opinion," says Mr. PEARSON in a note

accompanying some specimens presented to the Society, "that it may be referred to the genus *Dicrurus*, near to the *Muscicapidæ*; and this not only from the form of the head and bill; but on a careful examination of the feathers at the back of the neck, a few long ones may be found, more like hairs than feathers, with a small plume at the tip." Mr. HODGSON has forgotten to mention these setaceous feathers; but they may readily be found in the situation indicated by Mr. PEARSON.

After all, however, the bird in question, the slate-coloured shrike, seems to be an intermediate species, between *Dicrurus* and *Tricophorus*; the strong dentated bill, and short medial setaceous feathers connecting it with the former, and the wedge-shaped, or rounded tail, with the latter genus. It may be observed that Mr. PEARSON is inclined to think the species a migratory one at Midnapúr.

In his paper on this subject of migration* Mr. HODGSON remarks:

"I am led to conclude from what I have observed here, that the mass of the *Grallatores* and swimmers are found in the plains of India, only during the cold months, for they all arrive in the valley of *Nipal* from the north, towards and at the close of the rains; and all as regularly reappear from the south, upon, or soon after the accession of the hot weather."

Further on, he says,

"It will be noticed that the *Grallatores* which visit us or pass over us, are much more numerous than the *Natatores*; and, unless I am mistaken, observation in the plains of India would satisfactorily prove that this is a just and decisive indication of the superior prevalence of wading over swimming birds in that extensive region. India, I fancy, is too hot for the taste of the *Natatores*, a great majority of which seem to affect Arctic regions, or at least, high latitudes: I throw out the remark for canvas and inquiry."

This observation is agreeable to what we learn of the manners of these birds in high northern latitudes: and the hint should be taken by some cis-Himálayan naturalist, who will find the inquiry suggested, an interesting and not very laborious one. The wild swan was once seen in Nipál.

The next Zoological paper, the 8th of the part, is on the wild goat and wild sheep of Nipál. And here again Mr. HODGSON is puzzled by what has puzzled all naturalists, who have studied these groups of the *Ruminantia*, from ARISTOTLE to HAMILTON SMITH;—the line of separation between the goats and the sheep. Now to a common man no doubt the matter appears easy enough: he knows a goat from a sheep and *vice versa* any day;—but the line of separation, in spite of all this, is so narrow that the ancients considered the latter a hybrid

* On the migration of the *Natatores* and *Grallatores*, as observed at Kathmandu, page 122.

production of the former; and even at this day stories of a mixed prolific breed being common in Russia and America are rather disbelieved to be true than proved to be false, though reason and analogy alike condemn a theory so little supported by what we see, and so contrary to the common received opinions of modern science. Indeed, were it proved that such a breed is in existence, the fact would go much farther than to overthrow a mere generic distinction. It would shew that the established notion of specific differences depending upon the test of an unprolific offspring, is incorrect; and, that, instead of there being *two genera* of goats and sheep, there is in fact but *one species* of the whole. Mr. HODGSON of course leaves the matter where he found it.

Some uncertainty prevails as to the goat Mr. HODGSON describes being identical or not with one noticed by M. DUVAUCEL. The notice appears to have been sent to Paris, and it is appended by the Secretary to the Society to the present article, taken however from the original manuscript. M. DUVAUCEL's specimen, also, was a young one, and as he has not given it a name, nor yet appended the native one, it is impossible to ascertain whether or not his and Mr. HODGSON's *Capra Jhâral* are the same. At all events Mr. HODGSON does not seem to have known of M. DUVAUCEL's paper, and the credit of first bringing this animal to notice properly belongs to him*.

Of the sheep, the *Ovis Nayaur*, Mr. HODGSON has seen only the female in the adult state, and the young of the male, and he is consequently uncertain whether it is a new species. But in a note appended to the 9th article the author says:—

“From much conversation that I had with the Bhotea who brought me the skin of the young male *Nayaur*, I now incline to believe that I was mistaken in supposing there are two species of wild sheep in these regions. The *Bharal* of one dialect is probably the *Nayaur* of another, and the Himâlayan wild sheep most likely only a variety of that widely-diffused species *Ovis Argali*; though I must confess I cannot reconcile LINNÆUS or SHAW's descriptions of the horns of the *Nayaur*.”

The *Râtwa* deer of Mr. HODGSON, perhaps the *Cervus Muntjak* of PENNANT, forms the subject of the 9th article. There is little doubt of this animal being really the *Cervus Muntjak*, the *Kijang*, or at least a variety of that species. Though Mr. HODGSON attaching more importance to colour than it deserves, thinks, that as

* Mr. HODGSON, in a private note, explains that, “M. DUVAUCEL's description refers to the *Ghorâl*, which all our English zoologists class with the antelopes, because it has suborbital sinuses and cylindrical horns. The latter obvious character should have prevented its being confounded with the *Jhâral*, which has angular horns.”—ED.

"In one of BUFFON's Supplements it seems the *Cervus Muntjak* is described as of a greyish brown colour : if this be just, *Cervus Muntjak* will constitute probably a distinct species from *Rdtwa* ; and I cannot help thinking that, in such case, the two ought to be sectionally at least separated from *Cervus*."

The meaning of its being sectionally separated is not very obvious. If he means, as is probable, that the *Muntjak* and its kind are generically different from the genus *Cervus*, he is quite correct, and he will find on reference to CUVIER that this separation has been already made. The new genus contains five species, natives of Java, the Phillipines, Malacca, Nepál, and several other countries.

But, to return to the author, it is certain that differences of shades of colour can hardly be a sufficient warrant for instituting a new species, though perhaps it may, by taking some latitude, a variety ; colour in the whole *ruminantiæ* being liable to variation by many contingent circumstances, such as climate, season, age, sex, &c. If, therefore, there is nothing to warrant the measure of separating Mr. HODGSON's *Muntjak*, from that of PENNANT, but the circumstance of the one being fulvous and the other greyish brown, the specific separation cannot be allowed.

But the *Cervus Muntjak*, sent from Sumatra, is in every instance of a *fulvous*, or *reddish brown*, the colour it would appear, of Mr. HODGSON's specimens. The individual described in BUFFON's supplement was probably aged, if so the difference may readily be accounted for by the knowledge of the fact, that as old age comes on, the fulvous is gradually obliterated by the grey. The thickening of the pedestals of the horns at the top in the "form a rose," and the meaning of which Mr. HODGSON "cannot divine," is also merely a sign of age.

Thus there is little doubt of the identity of the *Muntjak* of PENNANT, BUFFON, SHAW, and HODGSON : and there is reason to believe, this species extends in a continued range, from the eastern Islands to Nipál, through the whole Indian continent. Two horns attached to the frontal bone are now in Calcutta, which correspond in every respect with the description of Mr. HODGSON and Sir T. S. RAFFLES, and which were found at *Jellalur*, in the district of *Midnapúr*, province of *Orissa* ; and several fawns were brought into *Midnapúr* in the year 1831. They all died young, before the horns were developed ; yet their general appearance and the form of the cranium left no doubt of their belonging to this genus.

Mr. HODGSON, however, if he has failed to establish a new species of *Styllocerus* (as the genus or subgenus is now called), has cleared up one point, that relating to the two antlers or projections on the horns,

being an accident, or *lusus naturæ*, of rare instead of, as was at one time supposed, constant occurrence. A doubt has been thrown upon PENNANT from this circumstance, which he does not deserve, and which our author will be glad to have satisfactorily overthrown.

Article XI. is an admirable description of the most splendid specimen of all the known species of horn bill, the *Buceros Homrai* of HODGSON. To this description nothing can be added, comprising as it does every minute point, in age, sex, and variety. Four, perhaps five, species of *Buceros* may now be considered as belonging to continental India, and Mr. HODGSON seems to have established the fact of their all being strictly frugivorous; and not partially carnivorous, as was erroneously supposed, from analogy with the Toucan. Indeed there is good reason to believe that this latter bird has been libelled; the cannibal propensities it has occasionally exhibited having been developed only in a state of confinement.

An anatomical notice is affixed to the description by Mr. BRAMLEY, a gentleman whose numerous professional avocations are to be regretted as preventing him from devoting zoological talent of no ordinary standard entirely to scientific pursuits. The peculiarity in structure of the cranium mentioned by Mr. BRAMLEY is the want of motion between it and the bill. He might also have noticed another; in the internal cavity of the bill being almost filled with osseous reticulations, instead of, for the greater part, occupied with membranous cells, as is the case in most other species of this genus. Mr. BRAMLEY also notices the lax union of the dorsal vertebræ, and in doing so, touches upon the doctrine of compensation.

Of this doctrine it may be well to say a few words, especially as it seems to be daily gaining ground among certain speculative, but scientific men, of whom M. M. CHABRIER and AUDOUIN among the French, and MACLEAY and VIGORS among the English, are at present the acknowledged heads. Their great object is generalization, and the natural fondness of mankind for conjecture, their means. Their doctrine may be stated in a few words.

All animals have a determinate number of parts, differing only in the degree of development; the development of one organ exerting an inverse influence upon another.

So much for the ingenious and convenient doctrine of compensation. But to return to Mr. BRAMLEY, who in speaking of the bill of the *Buceros Homrai* remarks:—

“The casket (which is of large dimensions) has also its horny covering, though somewhat different in structure, that of the former being laminated and bearing a

close resemblance to proper horn, while that of the latter is much thinner, of a fibrous consistence, and nail-like in structure. The edges of the bills, of both mandibles, for about two-thirds of their length from the point, are horny, but the surface is so irregular and jagged that their appearance leaves no doubt that much of the natural structure has been broken off, by the use which the bird makes of its bill. In consequence of this when the jaws are close, there is a considerable vacancy between the cutting edges throughout the whole central portion of the bill. In some specimens in Mr. HODGSON'S collection the fractures have taken place at such regular intervals, as to give to those parts the appearance of natural indentations.

"To entertain this supposition, however, would be erroneous, as there is evident reason to believe that in a bill which is perfect, the horn by which it is covered does not extend to its edges, but terminates just before it arrives at these, in a substance not very unlike solid bone.

"The chief difference from the latter is, that it is exceedingly brittle in its nature, though it is by no means deficient in compactness.

"That this substance borders the edges of both mandibles in their natural state, is confirmed by numerous portions which are here and there left in all the specimens I have examined. There is, also, a distinct line along the bills denoting the termination of the horn, into this hard structure, which in some individuals is of a red colour and in others a black."

Now this horny covering of the bill does not appear different from that of the casque, (or casket, as Dr. BRAMLEY terms it,) in any essential particular, the structure in both being of a laminated rather than of a fibrous nature, and the hard callous edging of the bill is common to all the genus. In the *Homrai* it is more manifest perhaps than in some other species, but it is still more developed in the Rhinoceros Hornbill. It resembles the enamel-like shelly substance, observable at the hinge in many genera of bivalve *Mollusca*, rather than bone, and appears to be a continuation and hardened folding of the internal lining of the bill, with which it comes off, or separates, on long maceration in water. On a careful examination of a bill in this state, it will be found to be not confined to the edges of the bill, but also to be met with, in a greater or less degree, at the gape, and along the central ridges inside the mouth, both above and below.

The last zoological article in the volume is also by Mr. HODGSON, and entitled "A description of the wild dog of the Himálaya." The specific character and name are as follows:—

"*CANIS PRIMÆVUS* (mihi) the *Buansu* of the Nipálese. *Habitat*, the whole of the sub-Himalayan ranges from the Sutlej on the west to the Brahmaputra on the east.

"*SPECIFIC CHARACTER.* Wild dog, with six molars only in the lower jaw, double coat, having soled feet, large erect ears, and very bushy straight tail, of medial length, deep rusty colour above, yellowish below."

Mr. HODGSON's object in this paper is to bring to scientific notice a new variety of dog, and to prove that variety to be, as he terms it, the *Canis primævus*. Some of his characters, it will be seen in the above quotation, are generic instead of specific. And the circumstances of there being six molars in the lower jaw, and of the peculiarities of the urine and eyes, and in short the whole differences from the common dog pointed out by Mr. HODGSON, surely so far from proving that the *Buánsu* is the *Canis primævus*, the type of the canine race, go very much in favour of the theory which may be formed by "the querulous objector," who rejecting Mr. HODGSON's speculations may be inclined "to substitute his own; creating, if he pleases, a new subdivision of the *Digitigrades*, characterised by one tubercular tooth behind the great carnivorous tooth of the lower jaw."

But to enter fully into this subject would be to exceed the limits that can be allowed to this paper; and the more unnecessary, that after all it would still remain as uncertain as at present. But whatever may be the result of Mr. HODGSON's speculations, he has certainly given in the *Buánsu* a new animal to zoology.

Something should be said upon the subject of the plates and the nomenclature. Of the former it may be remarked, that they are considerably better than the zoological ones of the last part (indeed they could not be worse, it may fairly be presumed), though they are much inferior to others in the present part. They are evidently fac-similes of the drawings made on the spot chiefly by native artists, and it would be hazardous to deviate from these even for the sake of pictorial improvement. It is matter of congratulation that Mr. HODGSON has not followed the system of nomenclature, to which it is to be feared too many men of real genius have lent their names, that of calling a production of nature after the surname of an individual. It is a practice which must tend to the confusion of science; and which becomes ridiculous by the ill assorted union of a barbarous cognomen with a classical termination. One great reform of Linnæus was the substitution of a trivial name for a description, or *titulus*; but it was intended that that name should be descriptive in itself, so that the mind might be guided by the ear. True it is that in some instances even Linnæus forgot his own rules; but the errors of great men should be a beacon to their less talented fellows, rather than an example or an excuse. A compliment of this kind may display an amiable, a grateful, or an admiring disposition, when paid to our friends, or to public benefactors; but, this is not a subject in which they should be exhibited, for science is surely diverted from its proper channels when made to administer merely to private friendship, or to public applause.

Mr. HODGSON's plan, however, is not without objections, though infinitely superior to that deprecated above. Native names are often applied to a large class of sometimes very different animals, and vary in every district : and a name derived from the habitat is objectionable where that habitat extends through a wide range. The *Parra Chinensis*, or *Sinensis*, for it has been called by both names indiscriminately, has been found at Tamlúk ; and the *Buceros Gingianus* is a native of Midnapúr.

By the above notice it will be seen that the zoological papers in this part are most creditable to Mr. HODGSON in every point of view ; exhibiting as they do, his knowledge, research, and industry, in the most favourable light : and it is to be hoped that his example will be followed by the many men of talent which India can boast of, and who have time at their disposal. Among those who have already distinguished themselves in this way, may be mentioned Messrs. HODGSON, BENSON, GRANT, HUTTON*, and several anonymous contributors of articles in the "GLEANINGS IN SCIENCE," and "JOURNAL OF THE ASIATIC SOCIETY." We may fairly anticipate that their exertions will be redoubled by the example set before them by Mr. HODGSON ; nay, we may surely in these times, and under a government, the head of which is so justly celebrated for the anxiety he has ever evinced to promote the cause of science, indulge a hope that officers, duly qualified for the purpose of investigating the productions of nature, will be sent upon missions, likely to afford facilities for the purpose, into remote or little frequented countries. Our expeditions, hitherto, have not been remarkable for the scientific talent they have displayed, though the countries of Java, Birma, Tiber, Siam, and Chira Punjí, afford the most valuable fossil remains of a former, and the most curious specimens of the living world. An amusing instance of the English-Indian method of pursuing scientific inquiries, is to be met with in the expedition sent by Major BURNEY to collect fossils on the site of Dr. CRAWFURD's collections ; in which the exertions of that gentleman, remarkable as he is for his zeal in the cause, were frustrated by the fact of his having nobody but an Apothecary at his disposal, who was so little conversant with the subject, that though "the ground was every where strewn with fragments of petrified bones and trees, he unfortunately fell in with nothing worthy of notice." "He seems," says the Editor, "to have looked for skeletons in a more perfect state, and to have imagined that such had been collected by Dr. CRAWFURD, which is far

* To this gentleman the author of the present notice owes his thanks for some specimens of a species of *Valvata* and eggs of *Ampullaria* ; and his apologies for not having noticed them before.

from being the case." It is really deplorable the manner in which natural history has been neglected in India : and justly has it been remarked that we know more of the animals of Africa than of Bengal, a country that has been so long in our possession ! France created her magnificent work on Egypt and its productions during a warlike occupancy of a few months : England after a peaceable possession of India of many times the number of years, has not, under the patronage of her Government, done enough to fill a single volume. J. T. P.

V.—*Note on the extraordinary Fall of the Barometer during the Gale of the 21st May last.*—By Jas. Prinsep, Sec. &c.

In the meteorological register for May I noticed the great fall in the Barometer which took place previous to and during the severe gale that did so much damage at the mouth of the river *Hooghly* : I have since been favored with an extract from the register of the barometer kept on board the H. C. Ship *Duke of York*, one of the numerous vessels wrecked or stranded along the *Hijlee* coast. This ship lay apparently in the line of greatest force of the gale, and the depression experienced in the barometer, confirmed as it is by the indications of a sympiesometer also on board, give us a terrible proof of the intensity of the storm : the fall in Calcutta was three-quarters of an inch ; at Saugor it appears by the following note, for the authenticity of which I can vouch, to have been upwards of *two inches* !

" My dear Sir,

" It is but now that I am able to forward you the particulars of the fall of the mercury during the late gale. They are as follow :—

		inch.	Ther.
Tuesday, 21st May, 1833,	8 A. M. The Barometer stood at,.....	29.09	80
	9 „	28.67	80½
	10 „	28.00	80
	11 „ no mercury in sight in the tube*,	26.30	80
	11.30 „ mercury re-appeared,.....	26.50	80
	Noon,	27.00	79½
	4 P. M..... ..	27.50	79
	8 „	28.00	80
	Midnight,	28.60	80½
Wednesday, 22nd....	4 A. M..... ..	28.20	81
	8 „	28.30	82
	Noon,	28.60	84

"The times of the changes are copied from those set down almost immediately after the gale, of course from recollection. Some of the lower altitudes of the mercury, also, may be more or less incorrect, having been below the range of the index.

"The oil in the sympiesometer retired completely into the bulb when the mercury in the barometer disappeared, and rose again a little before it. The mer-

* We presume this must have been below 26.50 inches.—Ed.

cury in the barometer did not, after Tuesday night, or rather Wednesday morning, act as it should have done, which was found to be owing to some water having got down upon the leather bag and loosened it from the wood, and so having permitted the escape of the mercury." W. T. D.

The severity of this hurricane fell on *Kedgerie* and *Saugor*. It was not felt at Balasore. Should simultaneous observations have been made at *Midnapúr*, or elsewhere within its influence, they will prove useful in tracing its course.

I take this opportunity of recording the observations made during the storm of the 7th October, 1832, which were delayed at the time in expectation of receiving further information such as should enable me to map the progress of the storm, but in vain, as I was only favored with coincident observations at *Ghazipúr*, which place may be esteemed quite out of the influence of the phenomenon, although a slight fall of 0.110 inch is perceptible in the register. The first column in the table below is derived from the log of the ship *London*, Captain WIMBLE, which, it may be remembered, of all the ships then running up the Bay, experienced the effects of the gale in the severest manner, being dismasted and nearly destroyed. This gale however fell far short of the recent hurricane.

Range of the Barometer during the Gale of the 7th October, 1832.

Date.	Hour.	On board the London, Lat. 18° 26' to 20° 23' Long. 86° 30' to 90° E.		At Calcutta, reduced to 32° Fahr.		At Ghazipúr.
		<i>inches.</i>		<i>inches.</i>		<i>inches.</i>
6th	8 A. M.	29.70	cloudy weather,	29.76	rainy, N.E.	29.82
	Midnight,	29.50	squalls and rain,	29.69	gale E.	
7th	8 A. M.	29.40	ditto, N. E.	29.55	ditto, rain, E.	29.75
	10 A. M.	—	strong gales, E.N.E.	29.52	increasing, E.	
	Noon,	28.90	increasing,	29.41	shifted to S.W.	
	4 P. M.	28.80	fresh gales E. by N.	29.20	maximum force,	29.65
	6 P. M.	28.50	a hurricane,	29.32	moderating, S.W.	
	8 P. M.	27.80	tremendous hurricane,	—	ditto, S. W.	
	9 P. M.	28.10	wind shifted to S.			
	10 P. M.	28.20	W. and blew with			
	12 P. M.	29.00	increased violence,	29.54	ditto, S. W.	29.71
8th	6 A. M.	29.30	more moderate,			
	Noon,	29.50	moderating, S.W.	29.66	strong wind, S.W.	
9th	6 A. M.	29.80	strong gales, high sea,	29.73	abated, N. W.	
			strong breezes, S.W.	29.75	cloudy, S. E.	29.71

At Bankura (by the Met. Register published in the last No.) the fall of the barometer was 0.480 inches.

VI.—Climate of Singapur.

The following abstract tables of the Thermometrical and Barometrical range for six years at *Singapur* were drawn up by Captain C. E. DAVIS from his own daily observations, and were presented to the Asiatic Society in the year 1827. The barometer is not corrected to the freezing point, neither are the hours selected capable of shewing the diurnal oscillations of the pressure; but in all other respects the tables are very regular, and form a valuable addition to our meteorological information.

1820.	Barometer.						Thermometer.					
	Average of the Month.			Least Range.			Average of the Month.			Greatest Range.		
	6 A. M.	Noon.	6 P. M.	6 A. M.	Noon.	6 P. M.	6 A. M.	Noon.	6 P. M.	6 A. M.	Noon.	6 P. M.
January,	29.88	29.92	29.88	29.86	29.90	29.86	74.1	81.2	77.3	76.	85.	83.
February,	29.87	29.90	29.87	29.82	29.85	29.80	74.4	81.7	78.8	76.	86.	84.
March,	29.90	29.89	29.87	29.82	29.84	29.80	74.8	82.9	80.6	76.	86.	83.
April,	29.89	29.98	29.87	29.82	29.81	29.81	75.6	84.6	82.2	77.	86.	85.
May,	29.88	29.89	29.84	29.78	29.75	29.75	76.6	85.4	84.	82.	88.	87.
June,	29.90	29.92	29.86	29.83	29.86	29.83	76.2	86.	84.	78.	87.	85.
July,	29.90	29.91	29.89	29.83	29.85	29.82	75.5	82.1	81.2	78.	86.	85.
August,	29.90	29.93	29.90	29.85	29.86	29.83	76.6	82.2	81.8	82.	88.	85.
September,	29.93	29.95	29.91	29.88	29.90	29.88	76.1	82.5	81.4	80.	87.	85.
October,	29.92	29.94	29.89	29.87	29.87	29.85	75.8	83.	81.9	79.	87.	88.
November,	29.87	29.91	29.86	29.81	29.85	29.78	75.	82.8	80.1	77.	86.	86.
December,	29.88	29.94	29.90	29.83	29.89	29.83	74.9	80.2	78.2	77.	85.	83.
Annual average, .	29.90	29.92	29.88	29.83	29.85	29.82	75.7	82.8	80.9	87.1	86.4	84.1
January, 1821, .	29.98	29.96	29.91	29.83	29.86	29.83	73.5	80.	77.9	75.	84.5	82.
February,	29.98	29.99	29.94	29.91	29.91	29.82	74.5	83.5	80.8	76.	85.	84.
March,	29.93	29.97	29.91	29.83	29.92	29.84	75.	83.9	81.8	78.	87.	84.
April,	29.98	29.96	29.92	29.87	29.90	29.83	77.	82.1	80.3	78.	87.	85.
May,	29.98	29.92	29.88	29.80	29.86	29.80	77.8	83.6	83.2	83.	89.	86.
June,	29.88	29.98	29.94	29.87	29.91	29.87	77.4	84.8	83.6	82.	88.	86.
July,	29.95	29.91	29.85	29.86	29.86	29.82	78.6	83.9	83.3	82.	88.	88.
August,	29.91	29.94	29.90	29.84	29.84	29.84	76.2	84.2	83.6	82.	88.	85.
September,	29.93	29.95	29.89	29.84	29.87	29.84	74.5	83.5	82.5	82.	88.	87.
October,	29.91	29.97	29.91	29.88	29.88	29.85	77.2	83.6	82.7	82.	88.	86.
November,	29.91	29.95	29.96	29.85	29.90	29.84	76.6	83.9	82.	79.	86.	85.
December,	29.92	29.94	29.86	29.83	29.88	29.83	75.6	82.7	80.5	78.	86.	85.
Annual average, .	29.93	29.95	29.91	29.85	29.88	29.83	76.4	83.5	81.9	79.	87.	85.

1892.	Barometer.						Thermometer.											
	Average of the Month.			Greatest Range.			Least Range.			Average of the Month.			Greatest Range.			Least Range.		
	6			6			6			6			6			6		
	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.
January,	29.94	29.97	29.92	29.99	30.00	29.99	29.88	29.88	29.82	75.5	82.9	81.	77.	86.5	86.	73.	75.	74.
February,	29.92	29.93	29.91	29.98	30.04	29.98	29.85	29.88	29.82	75.7	84.4	82.	77.	86.5	86.	73.	78.	78.
March,	29.96	29.97	29.92	30.02	30.05	29.99	29.90	29.91	29.87	76.	81.4	82.	77.	89.	85.	74.	77.	78.
April,	29.93	29.96	29.90	30.00	30.04	29.96	29.88	29.91	29.84	76.4	85.	82.6	78.	87.	86.5	73.	81.	80.
May,	29.89	29.91	29.85	29.99	30.03	29.94	29.80	29.77	29.78	75.5	85.3	83.6	81	88.5	87.	76.	80.	79.5
June,	29.90	29.92	29.89	29.97	29.99	29.95	29.80	29.77	29.78	78.4	84.6	83.3	83.	88.	87.	74.	77.	74.5
July,	29.91	29.92	29.88	29.97	29.99	29.96	29.86	29.88	29.81	77.8	86.6	81.2	83.	89.	87.	75.	76.	76.
August,	29.91	29.93	29.88	29.99	29.99	29.94	29.85	29.88	29.82	76.6	82.2	85.4	81.	87.	86.	72.	77.	79.
September,	29.90	29.92	29.87	29.98	29.99	29.95	29.84	29.87	29.81	76.9	84.4	84.	80.	88.	86.	75.	75.	79.
October,	29.90	29.93	29.91	29.95	29.98	29.97	29.84	29.85	29.83	77.	84.9	82.9	80.	89.	86.	73.	80.	79.
November,	29.91	29.93	29.89	29.94	29.97	29.94	29.87	29.88	29.84	76.2	83.5	82.5	78.	88.	85.	74.	78.	77.
December,	29.89	29.91	29.86	29.98	29.99	29.92	29.83	29.85	29.80	75.1	80.6	79.3	78.	85.	84.	73.	73.	74.
Annual average,...	29.91	29.93	29.89	29.98	30.00	29.96	29.85	29.86	29.82	76.4	84.0	82.5	79.1	87.6	85.9	73.8	77.2	77.3
January, 1823, ...	29.95	29.97	29.92	30.06	30.06	29.99	29.89	29.84	29.86	74.2	81.	79.2	76.	85.	83.	72.	76.	74.
February,	29.95	29.97	29.93	30.02	30.07	29.99	29.88	29.86	29.83	74.2	82.3	80.1	76.	86.	84.	72.	74.	76.
March,	29.88	29.95	29.89	29.99	30.00	29.95	29.87	29.88	29.83	73.3	84.6	81.4	78.	87.	84.	74.	79.	78.
April,	29.91	29.91	29.85	29.95	29.96	29.90	29.85	29.87	29.84	76.1	84.8	82.3	78.	87.	85.	72.	79.	78.
May,	29.87	29.90	29.86	29.91	29.95	29.91	29.84	29.86	29.81	77.3	83.8	82.5	79.	87.	86.	75.	81.	78.
June,	29.88	29.90	29.87	29.94	29.97	29.91	29.81	29.83	29.81	77.4	84.	83.1	82.	87.	86.	75.	78.	78.
July,	29.89	29.90	29.84	29.92	29.95	29.91	29.83	29.83	29.80	76.7	84.8	83.9	81.	88.	86.	74.	79.	81.
August,	29.90	29.91	29.88	29.94	29.96	29.91	29.85	29.85	29.83	77.7	83.5	82.7	81.	87.	85.	75.	78.	77.
September,	29.91	29.94	29.88	29.96	29.97	29.92	29.87	29.89	29.84	77.3	84.9	83.8	81.	88.	86.	75.	76.	76.
October,	29.92	29.93	29.90	29.99	29.99	29.93	29.85	29.85	29.82	76.5	83.6	82.8	82.	88.	86.	74.	78.	79.
November, ...	29.91	29.93	29.90	29.96	29.98	29.98	29.85	29.88	29.85	75.7	82.3	80.6	78.	88.	88.	74.	77.	76.
December, ...	29.95	29.96	29.92	29.99	30.03	29.98	29.89	29.90	29.85	75.5	83.6	81.3	76.	85.	86.	73.	81.	73.
Annual average, ..	29.91	29.93	29.88	29.97	29.99	29.94	29.87	29.87	29.83	75.9	83.7	82.1	79.	86.9	85.4	73.7	78.	77.6

1824.	Barometer.						Thermometer.					
	Average of the Month.			Greatest Range.			Least Range.			Average of the Month.		
	6			6			6			6		
	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.	A. M.	Noon.	P. M.
January,	29.99	30.00	29.97	30.09	30.10	30.09	29.87	29.88	29.85	75.4	83.3	80.3
February,	29.95	29.96	29.94	30.03	30.00	29.97	29.87	29.90	29.90	76.3	83.9	81.6
March,	29.94	29.96	29.90	30.08	30.09	30.04	29.88	29.91	29.86	77.6	84.2	80.3
April,	29.90	29.94	29.88	29.97	30.02	29.95	29.85	29.86	29.82	78.9	84.5	83.2
May,	29.88	29.92	29.90	29.94	29.97	29.92	29.83	29.85	29.81	77.7	83.1	82.8
June,	29.89	29.90	29.84	29.93	29.96	29.95	29.88	29.82	29.80	79.1	84.5	83.4
July,	29.92	29.93	29.98	29.98	30.00	29.95	29.80	29.88	29.86	80.	84.9	86.4
August,	29.84	29.96	29.90	29.96	30.00	29.98	29.87	29.87	29.87	79.4	84.5	83.7
September,	29.92	29.95	29.90	29.98	29.99	29.95	29.87	29.90	29.86	77.3	84.3	83.8
October,	29.91	29.93	29.89	29.97	29.99	29.94	29.87	29.87	29.85	76.6	84.3	83.1
November,	29.91	29.93	29.89	29.95	30.00	29.95	29.83	29.85	29.81	76.4	82.5	81.6
December,	29.97	29.96	29.92	30.00	30.03	29.99	29.90	29.92	29.89	75.3	80.2	79.8
Annual average,	29.91	29.94	29.90	29.99	30.06	29.97	29.85	29.87	29.84	77.7	84.	82.7
January, 1825, ..	29.94	29.95	29.92	30.03	30.06	29.99	29.90	29.90	29.87	75.1	80.9	79.9
February,	29.96	29.99	29.93	30.02	30.04	30.00	29.88	29.91	29.87	86.2	85.2	79.8
March,	29.91	29.93	29.89	29.97	29.99	29.97	29.83	29.85	29.83	76.5	84.6	83.6
April,	29.91	29.94	29.88	29.99	29.99	29.95	29.85	29.87	29.82	77.2	84.6	83.7
May,	29.88	29.91	29.87	29.94	29.99	29.91	29.83	29.84	29.82	77.6	84.7	83.7
June,	29.89	29.91	29.88	29.98	29.97	29.97	29.80	29.86	29.82	79.9	84.3	84.1
July,	29.88	29.85	29.87	29.95	29.96	29.92	29.82	29.83	29.83	76.6	82.9	82.6
August,	29.91	29.93	29.91	29.95	29.99	29.95	29.85	29.88	29.84	76.5	82.2	81.4
September,	29.92	29.98	29.91	29.99	30.03	29.98	29.85	29.87	29.83	77.6	83.3	80.6
October,	29.91	29.93	29.90	29.96	29.97	29.95	29.83	29.88	29.80	76.8	83.6	83.5
November,	29.97	29.89	29.87	29.91	29.95	29.93	29.80	29.83	29.80	76.6	84.3	82.9
December,	29.88	29.90	29.88	29.94	30.00	29.98	29.82	29.85	29.82	75.7	81.7	80.8
Annual average,	29.90	29.92	29.89	29.97	29.99	29.95	29.84	29.86	29.83	76.8	83.6	82.2
										80.2	87.	85.6
										73.6	77.6	77.6

VII.—*Culminating Stars observed with the Moon at Násirabád. By Lieut.-Colonel Thos. Oliver, &c.*

Date.	Stars.	No. of wires.	Sidereal Time of Transit.	Intervals in sidereal time.
			H. M. S.	H. M. S.
February 16th, 1831,	♄'s 1st border,	5	0 58 52.0	
	α Ceti,	5	2 53 26.4	+1 54 34.4
March 21st, 1831, ..	α Orionis,	5	5 46 01.8	—0 48 31.3
	♄'s 1st border,	5	6 34 33.1	
	α Geminorum, ..	5	7 23 49.0	+0 49 15.9
	α Canis min.	5	7 30 27.6	0 55 54.5
	β Geminorum, ..	5	7 34 58.4	1 00 25.3
March 22nd, ..	α Orionis,	5	5 46 01.8	—1 48 34.8
	α Geminorum, ..	5	7 23 48.9	0 10 47.7
	α Canis min.	5	7 30 27.6	0 04 09.0
	♄'s 1st border,	5	7 34 36.6	
September 14th. ..	α Scorpii,	4	16 19 04.7	—1 17 54.2
	♄'s 1st border,	5	17 36 58.9	
November 12th,	♄'s 1st border,	5	21 15 55.0	
	β Aquarii,	5	21 22 40.8	+0 06 45.8
	No. 2575, ..	5	21 33 52.4	0 17 57.4
	2586,	5	21 37 43.7	0 21 48.7
November 13th,	β Aquarii,	5	21 22 41.1	—0 44 51.8
	No. 2643,	5	22 04 25.6	0 03 07.3
	♄'s 1st border,	5	22 07 32.9	
February 8th, 1832,	α Arietis,	5	1 57 42.4	—0 24 44.0
	♄'s 1st border,	5	2 22 26.4	
	No. 293,	3	2 35 51.9	+0 13 25.5
	α Tauri,	5	4 26 17.6	2 03 51.2
February 10th,	α Arietis,	5	1 57 42.2	—2 18 21.3
	No. 375,	5	3 18 03.7	0 57 59.8
	383,	5	3 24 29.9	0 51 33.6
	392,	5	3 30 44.8	0 45 18.7
	♄'s 1st border,	5	4 16 03.5	
	No. 571,	5	4 19 04.4	+0 03 00.9
	α Tauri,	5	4 26 17.1	0 10 13.6
March 9th,	♄'s 1st border,	5	4 57 29.9	
	γ Orionis,	5	5 16 07.3	+0 18 37.4
March 10th, ..	α Tauri,	5	4 26 17.3	—1 33 05.0
	δ Orionis,	5	5 23 25.3	0 35 57.0
	ζ	5	5 32 16.8	0 27 05.5
	α	5	5 46 04.5	0 13 17.8
	♄'s 1st limb,	5	5 59 22.3	
	No. 768,	5	6 02 04.5	+0 02 42.2
March 12th, ..	α Tauri,	5	4 26 17.0	—3 39 23.1
	γ Orionis,	5	5 16 07.1	2 49 33.0
	α	5	5 46 04.7	2 19 35.4
	β Geminorum, ..	5	7 35 01.9	0 30 38.2
	♄'s 1st border, ..	5	8 05 40.1	

Date.	Stars.	No. of Wires.	Sidereal time of Transit.	Intervals in Sidereal time.
			H. M. S.	H. M. S.
April 8th,	α Geminorum,	5	7 23 52.2	— 0 22 28.4
	α Canis min,	5	7 30 30.2	0 15 50.4
	β Geminorum,	5	7 35 01.6	0 11 19.0
	\mathcal{D} 's 1st border,	5	7 46 20.6	
	No. 989,	5	7 56 20.7	+ 0 10 00.1
May 7th,	\mathcal{D} 's 1st border,	5	9 29 32.9	
	No. 1197,	5	9 51 20.2	+ 0 21 47.3
	α Leonis,	5	9 59 25.5	0 29 52.6
May 9th,	α Hydræ,	5	9 19 20.0	— 2 01 10.5
	α Leonis,	5	9 59 25.6	1 21 04.9
	No. 1338,	2	11 15 11.0	0 05 19.5
	\mathcal{D} 's 1st border,	5	11 20 30.5	
	No. 1369,	5	11 36 38.7	+ 0 16 08.2
June 6th,	β Leonis,	4	11 40 29.3	— 0 16 49.2
	\mathcal{D} 's 1st border,	5	11 57 18.5	
	α Virginis,	5	13 16 22.1	+ 1 19 03.6
June 7th,	No. 1465,	5	12 33 09.7	— 0 14 53.6
	\mathcal{D} 's 1st border,	5	12 48 03.3	
October 1st,	\mathcal{D} 's 1st border,	5	18 21 28.1	
	β Aquarii,	5	21 22 44.6	+ 3 01 16.5
November 1st,	β Aquarii,	5	21 22 44.1	— 0 04 37.1
	\mathcal{D} 's 1st border,	5	21 27 21.2	
	γ Capricornis,	5	21 30 47.7	+ 0 03 26.5
	α Aquarii,	5	21 57 10.9	0 29 49.7
	α Piscis aust,	5	22 48 23.4	1 21 02.3
November 29th,	β Aquarii,	5	21 22 44.4	— 0 34 00.8
	\mathcal{D} 's 1st border,	5	21 56 44.8	
	α Piscis aust,	5	22 48 22.8	+ 0 51 38.0
March 1st 1833,	α Tauri,	5	4 26 20.4	— 2 03 57.8
	γ Orionis,	5	5 16 10.3	1 14 07.9
	No. 804,	5	6 19 03.0	0 11 15.2
	\mathcal{D} 's 1st border,	5	6 30 18.2	
	α Geminorum,	5	7 23 56.6	+ 0 53 38.4
March 28th,	β Tauri,	5	5 15 43.5	— 0 52 50.4
	No. 684,	5	5 27 39.3	0 40 54.6
	775,	5	6 04 47.1	0 03 46.8
	\mathcal{D} 's 1st border,	5	6 08 33.9	
	No. 820,	5	6 28 03.3	+ 0 19 29.4
	831,	5	6 33 39.1	0 25 05.2
	872,	5	6 54 12.0	0 45 38.1
	α Geminorum,	5	7 23 56.1	1 15 22.2
	β	5	7 35 05.2	1 26 31.3
March 30th,	α Geminorum,	5	7 23 56.0	— 0 50 23.6
	β	5	7 35 05.1	0 39 14.5
	No. 967,	5	7 45 54.8	0 28 24.8
	\mathcal{D} 's 1st border,	5	8 14 19.6	
	No. 1048,	5	8 30 07.0	+ 0 15 47.4

Date.	Stars.	No. of Wires.	Sidereal time of Transit.		Intervals in Sidereal time.	
			H.	M. S.	H. M. S.	
March 31st,	α Canis min.	5	7	30 33.4	—	1 46 31.9
	β Geminorum,	5	7	35 05.2		1 42 00.1
	No. 1130,	5	9	09 39 6		0 07 25.7
	γ 's 1st border,	5	9	17 05.3		
	α Leonis,	5	9	59 29.1	+	0 42 23.8
	No. 1222,	5	10	07 43.2		0 50 37.9
	No 1232,	5	10	12 51.6		0 55 46.3
April 27th,	No. 1097,	5			—	0 07 32.5
	γ 's 1st border,	5		*		
	No. 1122,	5			+	0 09 07.2
	1130,	5				0 12 46.3
April 28th,	No. 1171,	5	7	32 14.3	—	2 24 50.7
	1175,	5	9	36 21.9		0 20 43.1
	1193,	5	9	49 14.4		0 07 50.6
	γ 's 1st border,	5	9	57 05.0		
	α Leonis,	5	9	59 28.8	+	0 02 23.8
	No 1254,	5	10	24 01.2		0 26 56.2
	1284,	5	10	40 29.1		0 43 24.1
April 29th,	α Leonis,	5	9	59 28.6	—	0 55 40.2
	No. 1254,	5	10	24 01.2		0 31 07.6
	1303,	5	10	52 05.6		0 03 03.2
	γ 's 1st border,	5	10	55 03.8		
	No. 1328,	5	11	08 42.1	+	0 13 33.3
	1334,	5	11	12 31.7		0 17 22.9
	1338,	5	11	15 13.2		0 20 04.4
April 30th,	α Leonis,	5	9	59 28.8	—	1 51 50.1
	No. 1371,	5	11	37 17.3		0 14 01.6
	β Leonis,	5	11	40 32.9		0 10 46.0
	γ 's 1st border,	5	11	51 18 9		
	No. 1415,	5	12	11 22.5	+	0 20 03.6

N. B. The numbers in the column headed "Stars" refer to the Catalogue of the London Astronomical Society.

Any of your readers who may have had observations of Moon Culminating Stars corresponding with any of the above, will confer a favor on me by publishing them in your valuable Journal.

VIII.—Chemical Analyses. By Jas. Prinsep, Sec., &c.

1. Three specimens of soil from sugar-cane fields.

The first was from a village called *Mothí* on the *Sarju*, ten miles north of the bank of the Ganges at Buxar. The other two were from soils on the south bank of the Ganges near the same place. Nos. 1 & 2 are represented as requiring irrigation, and No. 3, as sufficiently retentive of moisture to render it unnecessary. There is a substratum of *kankar*

* This evening I had no observations of well known Stars to determine the error of the Chronometer and Instrument : but the Intervals may, I think, be depended on.

throughout the whole of that part of the country, and to some mixture of this earth with the surface soil the fertility of the latter is ascribed : the cane produced is of small size, but it yields a pretty rich juice : by the native process each maund of juice affords six seer of *gúr*.

100 parts of each sort treated simultaneously gave the following results :

	No. 1.	No. 2.	No. 3.
Hygrometric moisture, on drying at 212°	2.5	2.1	3.6
Carbonaceous and vegetable matter, on calcination,	1 8	2.1	4.0
Carb. lime from digestion in nitric acid and precipitation by carb. pot. } (No. 3 alone effervesced,) 1.6	0.6	3.9	
Alkaline salt dissolved,	1.0	1.1	0.3
Silex and alumina,	94.1	24.1	88.2
	<hr/> 100.0	<hr/> 100.0	<hr/> 100.0

The earths were not further examined, but the two first consisted chiefly of sand, whereas the third was somewhat argillaceous. All three were of a soft fine-grained alluvium without pebbles : the analysis confirms the qualities ascribed to each of the specimens.

2. *Slaty anhracite from the hills south of Fatehpur in the Hoshangábád district, Nerbudda ; transmitted to Government by Captain J. R. Ouseley.*

A heavy dull slaty coal, splitting into laminæ marked with ferruginous oxide ; colour brownish grey, inclining, where rubbed, to the lustre of graphite : streak brown : specific gravity 1.880.

Exposed to a red heat, burns without flame, and leaves a very copious red ochreous ash. It is of a poorer description than most of the Indian coals, although evidently connected with the same deposit as the *Towa* or *Burhanáld* coal, included in the table published in the *GLEANINGS*, vol. iii. p. 283, and described further in page 293 ;—which left only 15 per cent. of ash. Richer coal doubtless accompanies these upper shales. Captain OUSELEY has traced the deposit farther south to *Tumání* near *Bhawergarh*, but no specimens have yet been furnished from the latter place. The composition of the Nerbudda coal is as follows :

Water, separated on sand-heat,....	3.5
Volatile matter, not inflammable,..	10.5
Fixed charcoal,.....	22.0
Red earthy residue,....	64.0
	<hr/> 100.0

3. *Peat of the Calcutta Alluvium, dug up from 30 feet below the surface, at the Chitpúr Lock-gates.*

Composition—Volatile matter, principally aqueous,....	62.0
Fixed carbonaceous matter,.....	16.7
Red ash,....	21.3
	<hr/> 100.0

4. *Bell of St. John's Cathedral, Calcutta.*

The great bell of this church, whose jarring and discordant sound has more than a million times reminded the neighbourhood of its cracked condition, has at last been removed, and a new bell is about to be founded to supply its place, under the superior skill of an eminent Engineer officer. The metal of which the old bell was composed turns out to be of a very brittle nature, and it is not surprising that it should have cracked (as recorded) under the effects of a *zor-se-tan* injunction from the delighted minister to the sexton, when it was first set up: it has a specific gravity of 8.887, and consists, in a hundred parts, of—

Copper,	67.0
Tin,	25.0
Zinc,	8.0
	<hr/>
	100.0

5. *Ancient Copper Spear-heads, from Agra.*

An article in one of the English journals of science, some months ago, having mentioned, that on analysing ancient weapons of copper, found in Germany, the metal was found to be hardened with tin*; I was induced to examine some of the ancient spear-heads, which are frequently dug up in the neighbourhood of *Etáwa*, and are referred by the natives to the period of the *Mahábhárat* war. Some of these presented by Mr. CRACROFT to the Benares Lit. Soc. are described in the *Oriental Magazine*, for December, 1826.

Three of them were examined: the exterior colour of all was that of unmixed copper.

No. 1. An arrow head, (so called) broke with a purple granular fracture: spec. grav. 8.459 at 85°.

No. 2. A similar weapon, broke with less facility, and had a better grain: spec. grav. 8.801.

No. 3. A spear-head, or kind of sword-blade, true copper colour and texture: tough: spec. grav. 8.835.

Very slight traces of tin were discovered on solution in nitric acid, but not ponderable, and rather proceeding from slight impurity of the metal worked up than from intended mixture—no traces of silver or lead were found. The difference of specific gravity was perhaps due to the brittle texture of the first specimen, and to the sword-blade having been fashioned under the hammer.

6. *New Patent Sheathing Metal for Ships.*

A patent has lately been taken out in England, for a cheap *marine metal* or metallic sheathing, stated to be compounded of lead, antimony, and mercury, which seems to have succeeded in the only object which

* BRANDÉ'S JOURN. xx. p. 296.

ever could have been aimed at by its inventor ; that of gulling those who were foolish enough to put their trust in it. The following facts give authentic testimony of the worthlessness of the invention :—

“The Renown, a new ship built at Port Glasgow, her first voyage to India, was sheathed with this metal ; she had scarcely been at sea a month before the sheathing showed a rough and unclean appearance like a piece of wood which had been long in the water, but without the grass to it, and this kept going on worse and worse : and it was observed from the bowsprit, when the vessel pitched, that in many places it hung from the bottom like pieces of rags ; in some places large pieces were entirely gone, and what remained shewed every symptom as if it would soon follow, which it did : on examination of the pieces which came off, they appeared spotted, as if oxidizing fast into small holes ; by the time the ship arrived here many hundred sheets were gone from the bottom, and what was left as far as could be seen was very unclean.”

The metal in fact is nothing but a soft pewter, consisting of 95 parts of lead, and five of tin mixed with some antimony. Its specific gravity of 11.130 corroborates this analysis. No trace of mercury could be discovered by heating it in a retort to a temperature at which this metal would have risen in distillation.

The invention may have been suggested by an American patent taken out in London in 1831 for a sheathing metal of zinc and copper, combined in the proportions of 95 zinc to 5 copper. This compound, although superior to the pewter on account of its stiffness, would probably be liable to corrosion much more rapidly than copper ; the inventor however states that the addition of a small portion of copper greatly diminishes this liability, and adapts it well for the sheathing of ships and other purposes.

Zinc by itself corrodes very rapidly in a damp climate. A remarkable instance of this was witnessed not long since, in removing some slabs of spelter which had been stored on the floor of a godown belonging to Messrs. COCKERELL and Co. The lowermost slab was converted into a solid white substance throughout, apparently crystalline in its structure ; specific gravity 3.0. On heating in a test tube per se it disengaged much water and became yellow ; it dissolved with moderate effervescence in nitric acid. It was therefore a hydrated carbonate of zinc, or perhaps rather a mixture of hydrated oxide and carbonate, agreeing closely with the mineral from Bleyberg in Saxony, described by SMITHSON* as *hydrous carbonate*, a sub-species of *calamine*, which he states to be a stalactitic formation. This is a remarkable instance of the formation of a natural insoluble mineral by artificial, though unintentional, means.

* THOMSON'S Chemistry, iv. p. 483.

7. *Argentiferous Galena, from the Bor Khamti country, on the sources of the Irawadí river.*

A small specimen of this ore, received from Mr. BRUCE of *Sadiya*, in Asam, was found to contain one-fifth per cent. of silver : or after expelling the sulphur the lead would contain one-fourth per cent. This would hardly pay the expence of extraction, but the specimen was too small to give a fair average. The ore is however very valuable for the lead alone, yielding from 60 to 70 per cent. of that metal.

At *Brahmakund*, in Asam, from Mr. BRUCE's specimens, occurs a very fine white porcelain clay, which might be turned to use were there any demand for fine pottery in India, and were the locality a little more accessible.

IX.—*Earthquake of the 26th August.*

The daily papers have published notices of this phenomenon, as observed at a great many places in the interior of India, with more or less detail, from which the following general facts may be gathered :—

The direction of the vibration was from north-east to south-west : there were three principal shocks ; the first about half past six P. M. the second at half past eleven ; and the third or most severe shock, at about five minutes to twelve (Calcutta time). In the places where it was most felt slight and continued vibrations seem to have been experienced for the whole of the day following. As the time of the second vibration was accurately noted in Calcutta by the stopping of an astronomical clock, we may assume it as the best point of comparison with the times noted at other distant points. Applying the difference of longitude, a few of them may be thus classed.

	Observed		Diff. Long.		Cal. Time.		
	<i>h.</i>	<i>m.</i>		<i>m.</i>	<i>h.</i>	<i>m.</i>	
Katmandú, Nípal, second shock,	10	45	+	12	= 10	57	very severe ; loud noise.
Rungpúr, ditto.....	11	20	—	2	= 11	18	many houses injured, do.
Monghyr ditto,.....	11	27	+	7	= 11	34	walls cracked, noise heard.
Arrah, ditto.....	11	15	+	14	= 11	29	walls injured, do.
Under Rotas hills, ditto,.....	11	10	+	20	= 11	30	
Gorakhpúr, ditto,.....	11	20	+	19	= 11	39	walls cracked, &c.
Allahabad (vague), ditto,.....	11	0	+	28	= 11	28?	hollow sound from river.
Bankúra, ditto,.....	11	30	+	4	= 11	34	none such since 1814.
Calcutta, ditto,.....					= 11	34 48	no injury done.

At Monghyr, Rungpúr, Mozufferpúr, Malláí, and other places within the direct line of influence, many houses were destroyed or injured, and the alarm was great. At Katmandú, however, the following extract of a letter from Dr. A. CAMPBELL, dated the 28th inst. will shew that the consequences were more serious, and judging from the course of the phenomenon we may reasonably fear some dreadful catastrophe towards Lassa on the north of the great Himálayan range.

“ On the evening of the 26th, about 6 o'clock, the valley and neighbouring hills were visited by a severe shock of an earthquake : it lasted about 40 seconds, and during its continuance, there was a distinctly audible noise as of ordnance passing rapidly over a drawbridge. It seemed to me to come from the east, and I felt that it was travelling with the speed of lightning towards the west, and just under my feet : the houses shook most violently, and trees, shrubs, and the smallest plants were

set in motion, not shaking but waving to and fro from their very roots. No damage was done to life or property. At $\frac{1}{4}$ to eleven we had a similar shock in severity and duration, and at eleven a most tremendous one. It commenced gradually, and increased until the houses, trees, and every thing on the face of the ground seemed shaken from their foundations. The earth heaved most fearfully, and when the shock was at its worst we heard the clashing of falling tiles and bricks in every direction ; and to add to the impressiveness of the scene, a general shout rose from the people in all directions. The murmur of human prayers was carried audibly from the city to our grounds (a mile), and nothing could be more imposing and vast than the scene. In a dead calm the noise of a hundred cannon burst forth : full grown trees bended in all directions, and houses reeled about like drunken men. In our grounds no lives were lost, but in Katmandú 19 persons were buried under the ruins of their own houses, and in the towns of Bhatgaon and Patan, many more. This great shock continued for nearly a minute, and during the following hour there were six distinct and strong shocks, the ground in the intervals being scarcely if at all steady ; and from this time till yesterday morning there were upwards of 20 distinct and sharp shocks. The loss of property has been very great, 125 houses fell in Katmandú during the night of the 26th, and nearly as many more have been levelled with the ground. Up to this time, in consequence of the torrents of rain that have come down, finishing the work of destruction commenced by the earthquakes, the city and towns have been evacuated, men, children and women of the *purdah*, rich and poor, have been and still are on the plains about the towns. Innumerable temples have been destroyed, and the *very gods of them* have been crushed to atoms. A fine and large brick temple (100 feet high), built in imitation of the great one at Jaganath, came down by the run early yesterday morning, and two fine pillars built by BHIM SEN were demolished by the great shock. All yesterday and last night we had occasional small shakes, and we are still in a state of suspense regarding the finale. In 1829, daily shocks continued to occur for 40 days, but none of them equal to the great one we had on the 26th."

A subsequent note from the same gentleman, dated the 30th instant, gives further particulars of this disastrous event :—

"We still continue to be revisited by occasional shocks of earthquake, all less violent than the great one of the 26th, but sufficiently alarming. This morning, when at breakfast, we had rather a sharp one : they all seem to come from the same direction ; that is from the east and north-east. The places east of Katmandú have suffered most : Bhatgaon, a large town, has been almost entirely destroyed ; upwards of 1000 houses have been levelled with the ground, and few have escaped serious injury. 300 souls have perished in this town (Bhatgaon) alone, and the total number of lives lost throughout the valley, as yet ascertained, is estimated at 500. The unfortunate people in many instances are in sore distress ; their stores of grain being buried beneath the ruins of their late dwellings, and without money to purchase other food. The grain shops, as well as all others, are shut, and the people dare not return to their houses, but remain without sleep or shelter in the open air, under torrents of rain. The house of MATABAR SING, (a goodly modern mansion) is quite destroyed, and the large garden houses of BHIM SEN, and his brother, RAU BIR, are rendered, for the present, untenable. Scarce a large house in Katmandú has escaped serious injury. The fort at Chiropaní, on the road to this from the plains, is much injured, and almost all the Government buildings have sustained great injury."

Meteorological Register, kept at the Assay Office, Calcutta, for the month of August, 1833.

Day of the month.	Barometer read used to 32° Far h.				Thermometer in the Air.				Depression of moist-bulb Thermometer.				Hair Hygrometer.		Rain. Inches.	Wind.		Weather.	
	At 4½ A.M.	At 10 A.M.	At 4 P.M.	At 10 P.M.	Minimum at 4½ A.M.	At 10 A.M.	Max. by Reg. Ther.	At 4 P.M.	At 10 P.M.	At 4½ A.M.	At 10 A.M.	At 4 P.M.	At 10 P.M.	Morning.		Noon.	Evening.	Morning.	Noon.
1	512	571	505	507	81.1	84.7	85.6	85.0	82.8	2.3	3.5	2.8	3.2	99	98	S.	S. w.	wet. cum. nim.	hazy. cum. do
2	532	548	516	563	82.0	84.3	86.0	84.9	83.1	2.0	3.8	5.5	5.4	95	91	S.	S. w.	nimb. strat.	cloudy. do
3	542	560	498	545	81.5	84.1	80.2	88.4	85.0	4.2	4.3	5.3	4.3	94	92	S.	S. w.	do	do
4	508	510	510	552	80.2	83.0	80.0	87.5	85.2	2.2	4.0	4.5	3.8	95	95	S.	S. w.	nim.	do
5	495	571	503	534	83.0	82.5	80.4	87.2	80.1	3.9	3.2	4.1	1.6	97	96	S.	S. w.	haze. nimbi.	rain. do
6	509	564	431	510	80.0	84.5	83.8	85.6	84.0	4.4	4.0	3.7	4.4	94	94	S.	S. w.	haze. light clods.	nimb. do
7	454	500	461	482	82.0	84.5	81.4	87.7	85.5	4.8	5.5	6.5	4.1	91	90	S.	S. w.	haze. nim.	nimb. do
8	447	512	450	469	82.6	84.5	83.6	88.7	85.0	3.6	3.8	3.7	4.4	94	95	O.	n. w.	do	cir. strat.
9	467	552	484	563	85.0	85.3	86.7	88.7	80.8	4.2	4.3	4.2	3.1	95	95	O.	n. w.	do	nimb. do
10	544	545	528	593	81.2	86.3	90.2	90.5	81.2	2.3	4.0	5.8	4.0	95	91	O.	n.	clear.	do
11	563	604	477	536	80.7	86.3	90.2	87.6	83.0	3.1	3.6	4.4	2.6	95	96	O.	n.	nimb.	do
12	494	538	460	532	82.2	86.3	92.2	87.6	81.0	2.0	4.2	4.7	2.0	95	95	O.	n. e.	cum-strat.	cloudy.
13	494	550	474	550	82.3	84.3	83.2	86.0	82.2	2.6	3.7	3.7	3.9	97	95	O.	S. e.	overcast. float nimb.	storm.
14	546	635	584	603	81.8	84.3	83.0	85.9	82.3	1.5	4.0	4.7	3.3	95	94	S.	S. w.	nimb. overcast.	nimb. do
15	626	682	600	658	79.6	85.0	88.3	85.2	82.3	3.9	3.5	3.5	3.4	96	95	S.	S.	scud. cir. strat.	do
16	591	643	552	598	82.1	83.9	88.3	81.4	78.9	3.5	3.3	2.7	2.0	97	97	S.	S. w.	cum. str.	clouds.
17	566	585	523	576	82.2	83.9	89.3	85.0	81.5	1.9	3.4	3.8	2.8	97	94	S.	n.	cumuli.	drizzling.
18	513	588	528	603	78.2	83.8	89.3	84.8	81.1	2.0	3.4	3.4	2.3	95	97	O.	n.	do	nimb.
19	551	618	544	583	80.2	84.1	86.9	83.7	81.2	1.6	2.8	3.7	3.0	97	96	S.	S. e.	rain.	do
20	529	584	522	563	79.4	83.5	87.0	86.1	79.8	2.3	3.3	3.2	3.4	97	95	S.	S. e.	cloudy. nimb.	stratus.
21	530	545	472	535	79.3	83.5	87.0	84.2	81.4	2.0	3.3	3.2	3.4	97	95	S.	S. e.	do	fair.
22	473	530	485	559	79.4	83.5	87.0	86.2	82.2	1.7	3.6	4.0	3.9	97	89	S.	S. e.	clear.	do
23	486	609	466	600	79.2	85.0	91.7	89.6	81.1	3.7	4.0	7.2	3.1	96	91	O.	F.	do	nimb.
24	652	715	612	683	79.1	86.4	93.2	89.4	83.7	1.8	5.7	8.2	4.6	91	87	O.	F.	cir. & cum.	fair.
25	651	688	603	647	79.8	86.4	93.2	90.3	83.0	2.3	7.2	8.8	4.0	89	85	S.	S. e.	cumuli.	cloudy.
26	647	653	575	642	80.4	86.3	94.8	90.3	82.4	3.2	5.0	6.5	3.5	94	91	S.	n. e.	do	do
27	624	671	521	647	81.0	86.8	92.6	89.1	82.5	2.5	5.3	5.2	3.3	93	94	E.	S. e.	cum. strat.	rain.
28	642	687	622	711	81.0	87.5	91.8	86.5	81.3	2.6	5.0	4.5	2.3	94	96	E.	S. e.	do	cloudy.
29	655	711	624	691	80.7	86.7	90.6	85.4	80.3	2.0	4.3	5.1	4.0	93	91	S.	n. e.	cir. cum.	do
30	627	670	541	576	81.0	86.1	92.6	87.8	84.3	2.6	4.3	4.7	3.0	95	94	S.	n.	cumuli.	threatening.
31	530	557	433	400	82.6	87.5	90.	87.8	81.5	2.6	4.3	4.7	3.0	95	94	S.	n.	do	do
Mean	29.548	509	520	562	81.0	85.0	90.2	86.8	80.5	2.8	4.1	4.9	3.4	96	93	8.15	calores and variable.	rain less than average.	do

The Instruments for 10 A. M. and 4 P. M. are suspended in the free air of the Laboratory, the Barometer used at those hours stands .044 lower than the Surveyor General's, the correction for the other Barometer will be given hereafter.

On the 26th, three shocks of an earthquake were felt in Calcutta, the first at about 6h. 40m. P. M. the second stopped an astronomical clock at the Surveyor General's Office, (vibrating N. and S.) at 11h. 34m. 48s. P. M. mean time. The severest shock was at 11h. 57m. P. M.

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